DOCUMENT RESUME

ED 030 556 SE 005 910

By-Bolton, Earle; Gueringer, June

Edgewood Independent School District Instructional Television Guides - Countdown, Teacher's Guide 5; Safari, Teacher's Guide 5; Probe, Teacher's Guide 6; Abacus, Teacher's Guide 6; Mathletics, Teacher's Guide 7. Algebraically Speaking, Teacher's Guide 8; Related Math I & II, Teacher's Guides 9 & 10; Spectra, Teacher's Guide 9.

Edgewood Independent School District, San Antonio, Tex.

Spons Agency-Office of Education (DHEW), Washington, D.C. Bureau of Elementary and Secondary Education.

Pub Date 65

Note-298p.

EDRS Price MF-$1.25 HC-$15.00

Descriptors-Algebra, Arithmetic, Course Content, *Course Objectives, Curriculum, *Elementary School Mathematics, Geometry, *Instructional Television, *Secondary School Mathematics, *Teaching Guides

Enclosed is a number of booklets containing lesson outlines of materials in mathematics and science. These outlines are designed to give teachers and students an idea of what to expect when a telecast is schedules for their classes. The tele-lessons are given for the purpose of providing enrichment activities and giving coherence to the entire mathematics and science program. It is expected that these lessons, which are designed to be applicable to the average student, will aid the teacher in presenting some of the more obscure and/or difficult topics of the course. The sequence of lesson outlines in this collection are (1) Countdown, Grade 5; (2) Abacus, Grade 6; (3) Mathletics, Grade 7; (4) Algebraically Speaking, Grade 8; and (5) Related Math I Grade 9, and II, Grade 10. (RP)

ED0 30556

BESE-Title III

COUNTDOWN

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

SE 005 910

Teacher's Guide-5

EDGEWOOD ISD INSTRUCTIONAL TELEVISION KHS77

COUNT DOWN
TEACHER'S TELEVISION GUIDE
FOR MATHEMATICS - GRADE 5

EDGEWOOD INDEPENDENT SCHOOL DISTRICT
INSTRUCTIONAL TELEVISION
KHS77 - TV

MR. EARLE BOLTON - MATH COORDINATOR

YOUR COORDINATOR'S MESSAGE

The lesson outlines that follow are designed to give you an idea of what to expect when a telecast is scheduled for your class. The telelessons are given for the purpose of providing enrichment and coherence for the entire math program and are not, in any way a substitute for what you, the teacher, will do in the classroom.

You are the key to successful learning and the telelessons are only a part of the overall learning situation.

In order to be better prepared for what is going to be discussed on TV please read each outline carefully before air time and where special preparations are required, take care of these necessities before the lesson begins. Your cooperation on this point is especially important, as the instructor will assume that these preparations have been made before he begins.

In some cases it may not be possible to cover all the material listed in the outline. In such cases you should, after the telecast, cover all topics that were ommitted because subsequent lessons may be based on some of this information.

Be sure to keep up to date and pace your class so that you will be discussing the topic that is to be covered on TV at the time it is scheduled. Deviation of a day or so either way will not matter but for maximum success we should all try to be together.

If you have suggestions or criticism, both adverse and complementary, please let us know. Only with your help can we make team-teaching through television a success.

Best of luck for a successful course!

Earle H Bolton

Earle H. Bolton
Mathematics Coordinator

RESPONSIBILITIES OF THE CLASSROOM TEACHER

BEFORE THE TELECAST:

Turn the receiver on five minutes before the scheduled time. Using the Teacher's Guide, the classroom teacher should give the students a general idea of what will be covered on the telecast.

Arouse the students' interest.

Introduce the subject matter.

Prepare the students for the lesson.

The teacher should set up a receptive atmosphere and adjust the TV receiver for a clear picture and good sound.

DURING THE TELECAST:

The classroom teacher should be in position to watch both the receiver and the students.

Supervise your class closely.

Observe students reactions.

Take notes for personal use.

AFTER THE TELECAST:

The sessions after the telecast should be used to promote enthusiasm and to furnish students an opportunity to perform individually. It is essential that some follow-up be provided.

Lead discussions.

Answer questions.

Explain vocabulary.

Lead into related activities (some of which are listed in the Teacher's Guide).

ABOUT THE COURSE

COUNT DOWN is the title given to this series of televised lessons designed for use at the fifth grade level. The telelessons presented in this series are designed to aid the teacher in presenting some of the more obscure and/or difficult topics of the course and are directed toward the average student, although, there should be something in every lesson that will appeal to both extremes of the ability scale.

Since it is difficult for the television teacher to allow for individual differences, this is left up to the classroom teacher who is in direct contact with the students.

Many of the topics covered in COUNT DOWN are those that have been suggested by successful fifth grade teachers throughout the district. We have attempted to incorporate as many of these teachers' suggestions as possible and are indebted to them for their honest and valued appraisal of the course.

Page numbers, which appear in the upper right-hand corner of the pages in this guide represent the approximate place in the text where each class should be during the week indicated. The pace of the course, as dictated by the TV schedule, was determined after a year of trial and represents the pace that has been followed by several successful teachers.

ABOUT THE TEXT

The text outline for this TV series is Arithmetic 5, by McSwain, Brown, Gundlack and Cooke (Laidlaw Bros., 1965). All page numbers and chapter headings refer to this text.

ABOUT THE TEACHER

Earle H. Bolton is coordinator of mathematics for the Edgewood Independent School District of San Antonio, Texas. He was a classroom teacher at the Edgewood High School for seven years. He has taught mathematics for both high ability and low level students. Mr. Bolton received his B.S. degree from the Georgia Institute of Technology in 1954 and his M.S. in mathematics from Trinity University in 1965.

TELEVISION OUTLINE

Channel 7

Time: 9:30, 11:30
1:30

Lesson Number	Date	Topic
1.	9/10/68	Introduction, Basic Concepts
2.	9/24/68	Addition and Subtraction of Whole Numbers
3.	10/8/68	Multiplication of Whole Numbers
4.	10/22/68	Two Digit Numbers in Multiplication
5.	11/5/68	Introduction to Division
6.	11/19/68	Two Digit Divisors (Long Division)
7.	12/3/68	Measurement, Weight, Time, Volume
8.	1/17/69	Mathematical Sentences
9.	1/21/69	More on Division
10.	2/4/69	Introduction to Fractions
11.	2/18/69	Addition of Fractions
12.	3/4/69	Subtraction of Fractions
13.	3/18/69	Geometry
14.	3/1/69	Perimeter and Area
15.	4/22/69	Introduction to Graphing
16.	5/6/69	A Survey of Decimals

OUTLINE SUBJECT TO REVISION

ALL TELECASTS ON TUESDAY

Lesson I Introduction - Basic Concepts

Pages 1-18

Objective: To introduce the TV series in mathematics and to give general definitions of some of the basic terms that will be used in the course.

Lesson Outline

I. Introductory remarks

  A. What is expected of the students

  B. Some suggestions for watching television

II. Number, numeral, the basic concepts

III. The decimal number system

IV. Rounding off numbers

Comments:

The study of mathematics involves much concentrated study, especially where specialized terms and definitions are involved. Therefore, it is necessary that the student becomes proficient in the art of taking notes quickly and carefully if he is to retain anything from the lessons. Please urge your students to prepare themselves beforethe telecast by having note-taking equipment ready. It's not a bad idea to give them a preview of what the lesson will cover, so that they can look for statements about the more important parts of the lesson and be ready to write definitions and take notes about these topics. If our only accomplishment during the year is to teach our students to take notes, this alone will be worth the effort of telecasting the math series.

Lesson II Addition and Subtraction of Whole Numbers Pages 19-49

Objective: To review operations with whole numbers.

Lesson Outline

I. Addition of whole numbers
    A. What are the whole numbers?
    B. The names of the parts of an addition problem
    C. The concept of "carrying" or "renaming"

II. The commutative property of addition

III. The associative property of addition

IV. Subtraction
    A. The parts of a subtraction problem
    B. Borrowing
    C. Using expanded notation in subtraction

Comments:

This lesson is basically a review of the operations of adding and subtracting whole numbers with a few variations in technique. The central theme of this lesson is not so much how to add and subtract, but why we do some of the things we do in performing these two important operations.

Lesson III Multiplication Pages 49-60

Objective: To show why we multiply like we do and to discuss some of the ways of indicating multiplication.

Lesson Outline

I. Multiplication of whole numbers
    A. The necessity of memorizing the multiplication tables through 9 X 9
    B. The parts of a multiplication problem
        1) Factors
        2) Product

II. The commutative property of multiplication

III. The associative property of multiplication

IV. Various ways of indicating multiplication
    A. The "times" sign
    B. The dot
    C. Parentheses

V. The distributive property of multiplication over addition

Comments:

A good exercise in analytical math can be introduced by posing the question of whether the distributive property holds for addition over multiplication, or whether it holds for multiplication over multiplication. The answer to both questions is "no". However, the importance of the exercise is not in determining the answer but in analyzing what happens when we apply these operations in a particular manner.

Lesson IV. Two Digit Multiplication

Pages 61-73

Objective: To use the distributive property and the property of regrouping to justify the process of multiplying two digit numbers.

Lesson Outline

I. Carrying in multiplication

II. Using the distributive property when multiplying a two digit number by another two digit number

III. Some short cuts when multiplying by numbers ending in zeros

Comments:

The process used in section II might be recognized as the same thing you used to do in your algebra classes:

$(a + b)(c + d) = ac + ad + bc + bd$

Lesson V Introduction to Division
Pages 73-93

Objective: To review division

Lesson Outline

I. Introduction to division

    A. Division as the inverse of multiplication

    B. The various parts of a division problem

        1) Dividend

        2) Divisor

        3) Quotient

        4) Remainder

II. Zero in division

    A. Dividing zero by a number

    B. We cannot divide by zero

III. Checking a division problem

Lesson VI Long Division Pages 93-111

Objective: To discuss the division and why it works

Lesson Outline

I. Two digit divisors

   A. The process of dividing by numbers with more than one digit

   B. Dividing by multipes of ten

II. The process of long division

III. Answers that do not come out even (remainders)

   A. The ways of writing the remainder (The preferred way is to write the remainder as a fraction of the divisor)

Comments:

While the text affixes an "R" to any part of the quotient that is left over in a division problem, our students should get into the habit of writing remainders as fractions. By the time you get them, they should be familiar with the concept of fractions. If not, now is the time for them to become familiar with the idea.

Lesson VII Measurement Pages 111-131

Objective: To discuss denominate numbers and the conversion of units

Lesson Outline

I. Units of measure

  A. A brief history of some of the more familiar units of measure

  B. Some conversion tables

II. Units of weight, temperature, time

III. A brief discussion of some of the merits of the metric system

Comments:

If we are moving too rapidly or too slowly, please do not hesitate to contact us at the television studio of the John F. Kennedy High School. Our schedule is always subject to revision if enough teachers feel that it needs revising.

Lesson VIII Mathematical Sentences

Pages 131-146

Objective: To discuss elementary equations; their nature and their solution

Lesson Outline

I. Algebraic expressions

   A. Some practice in expressing statements mathematically

   B. Mathematical shorthand

II. Types of mathematical sentences

   A. Equations

   B. Inequalities

III. Solution of word problems

Comments:

A lot of good proctice could result from the idea of writing mathematical statements from English statements. Students need to become used to the idea of using a variable to stand for an unknown quantity. Ask your students to write mathematical sentences that represent statements such as, "Five more than some number",or "Twice a number increased by two", etc. They may have a little trouble at first, but you'll be laying a valuable foundation for later mathematical adventures!

Lesson IX More on Division Pages 147-183

Objective: To go deeper into the division process.

Lesson Outline

I. Division with larger numbers

   A. Some puzzles and word problems involving long division

   B. Short cuts in division

Comments:

Probably the most important topic during the fifth grade is the topic of division. Students need a lot of drill here, especially in the process of "long" division. Be sure your students are aware of the fact that they can check their answer to a division problem by multiplying the quotient by the divisor and getting the dividend. If there is a remainder, it should be added to the quotient-divisor product in order to yield the dividend.

Lesson X . Introduction to Fractions
Pages 183-204

Objective: To discuss the nature and meaning of fractions, the various parts of a fraction, and the concept of equivalent fractions.

Lesson Outline

I. Introduction to fractions

   A. The nature and meaning of fractions

   B. Rational numbers

   C. The names of the parts of a fraction (numerator/denominator)

   D. Proper, improper and mixed fractions

II. Equivalent fractions

   A. How to show equivalence

   B. Use of the number line

III. Reducing (transforming) fractions

IV. Getting a fractional part of a whole number

Comments:

Fractions represent the weakest link in our entire math program. They are difficult to teach and difficult to learn. We need special emphasis here. Use as many physical objects as possible to show the equivalence relationships between fractions. A number line is a good teaching aid to show equivalence, and an old fashioned "pie" is about the best illustration you can find.

Lesson XI Addition of Fractions Pages 205-218

Objectives: To introduce the operations on fractions by discussing addition with special emphasis or unlike denominators and finding a common denominators.

Lesson Outline

I. Addition of fractions

   A. Like denominators

   B. Using the distributive law to justify addition with like denominators

$$\frac{6}{11} + \frac{2}{11} = \frac{1}{11} \quad (6 + 2) = \frac{8}{11}$$

II. Mixed fractions

III. Unlike denominators

   A. The necessity of having common denominators before adding

   B. How to find common denominators..... some suggestions

IV. Changing improper fractions to mixed expressions and back again.

Lesson XII Subtraction of Fractions

Pages 219-233

Objective: To discuss subtraction of fractions with special emphasis on the concept of "borrowing"

Lesson Outline

I. Subtraction of fractions

  A. General cases

  B. The case of "borrowing"

II. Subtracting where mixed expressions are involved.

Comments:

Although we have heard a lot of noise about referring to the process above (B) as "renaming", "regrouping", or some other "re" thing, go ahead and call it "borrowing" if you want to, because that's about what really happens when you work one of these problems.

Lesson XIII Geometry Pages 233-247

Objective: To give a brief introduction to the study of Geometry - with special emphasis on the study of the circle.

Lesson Outline

I. Geometry

  A. The meaning and history of geometry

  B. Points, lines, planes

  C. Closed figures in the plane

II. Classification of geometric figures

  A. Triangles

  B. Quadrilaterals

III. Parallel and intersecting lines

IV. Circles

  A. The various parts of a circle

    1) Radius

    2) Diameter

    3) Chords

    4) Arcs

Comments:

Numerous paper folding and cutting exercises can enhance the study of geometry. Students need to "feel" geometry as well as see and hear it. When discussing geometry, be sure and mention the differences between plane and solid figures (2 and 3 dimensions respectively).

Lesson XIV Perimeter and Area Pages 247-265

Objective: To define and discuss the difference between perimeter and area

Lesson Outline

I. Introduction to perimeter and area

   A. The concept of perimeter

   B. The formula for the perimeter of a rectangle, square, and triangle

II. Area

   A. The meaning of area

   B. Finding the area of a rectangle (demonstration)

Comments:

The sections on geometry should be challenging and interesting to your students and should provide an opportunity for some individual work in the area of geometric figures. Encourage your students to do some reading here as most of our school libraries have a few books about mathematics and most of these have sections on geometry.

Lesson XV Introduction to Graphing Pages 265-280

Objectives: To discuss the use of graphs to illustrate statistical data.
To consider the various types of graphs

Lesson Outline

I. Introduction to graphing

A. The uses of graphs in business

B. Some basic concepts about graphing

II. Types of graphs

A. Bar graphs

B. Line graphs

C. Circle graphs

III. Maps and scale drawings

Comments:

One has only to pick up a local newspaper to see the applications of graphing to business and industry. This is an area that has been somewhat neglected under the misconception that "everyone knows how to read a graph" and that teaching how to read them is a waste of time. Standardized tests show that some of our students cannot interpret graphical representations.

A good preparation for the lesson would be to have some students collect materials from magazines, newspapers, etc. and bring them to class. Lots of times just telling them that math is useful doesn't make much of an impression, but when they can actually see for themselves, the impact is greater.

Lesson XVI A Survey of Decimals Pages 281-290

Objective: To introduce the concept of decimal fractions

Lesson Outline

I. Introduction to decimals

  A. The concept of decimal fractions using tenths to illustrate the point

  B. The relationship between tenths and hundredths

II. Reading and writing decimals

  A. Expressing fractions that have powers of ten in their denominators as decimals

III. Adding and subtracting decimals

Comments:

Now that the television series is over, we would like to have your frank evaluation of the telelessons, the course outline and the instructor's technique. Send your comments to the television studio, John F. Kennedy High School. Please include any suggestions that you might have for improving our series.

ED0 30556

KHS 77

BESE-Title III

SAFARI

EDGEWOOD ISD INSTRUCTIONAL TELEVISION

TEACHER'S GUIDE — I

SE 006910

SAFARI
TEACHER'S TELEVISION GUIDE
FOR SCIENCE - GRADE 5

EDGEWOOD INDEPENDENT SCHOOL DISTRICT
INSTRUCTIONAL TELEVISION
KHS - 77 - TV

MRS. JUNE GUERINGER, SCIENCE COORDINATOR

COORDINATOR'S MESSAGE

The science television lessons should be an integral part of the science program. In team teaching, it is quite important that we are together in our topics. Both classroom and television lessons will be more meaningful to the students if our lessons are coordinated. We have prepared this outline of television lessons to give advance notice of the topics to be covered. We hope this will help you with your planning.

Please give the lesson outline to your students before they view the lesson. The outline will help them visualize the sequence and relationship of materials in the lesson. It is important for students to take notes during the telecast. At first, note taking may be difficult, but it should be stressed because of the importance of this ability. Please develop a testing program that will encompass the televised materials as well as text materials.

The television instructor will confer regularly with the classroom teachers for the purpose of evaluation and improvement of this program. Any suggestions will be gratefully accepted. With your help, we can make television time a valuable component in the education of our students.

June Gueringer
June Gueringer
Science Coordinator

RESPONSIBILITIES OF THE CLASSROOM TEACHER

BEFORE THE TELECAST:

Turn the receiver on five minutes before the scheduled time. Using the Teacher's Guide, the classroom teacher should give the students a general idea of what will be covered on the telecast.

Arouse the students' interest.

Introduce the subject matter.

Prepare the students for the lesson.

The teacher should set up a receptive atmosphere and adjust the TV receiver for a clear picture and good sound.

DURING THE TELECAST:

The classroom teacher should be in position to watch both the receiver and the students.

Supervise your class closely.

Observe students reactions.

Take notes for personal use.

AFTER THE TELECAST:

The sessions after the telecast should be used to promote enthusiasm and to furnish students an opportunity to perform individually. It is essential that some follow-up be provided.

Lead discussions.

Answer questions.

Explain vocabulary.

Lead into related activities (some of which are listed in the Teacher's Guide).

ABOUT THE SERIES

It is our hope that "Safari" will be an effective audio-visual aid and an integral part of the classroom science program. We have incorporated the same types of experiences in the television lessons that you will find in the textbook. Some activities are experiments while others are discovery or nondiscovery in nature. All are intended to be a catalyst for your classroom activities.

Remember that the classroom teacher is the key to the success of our television program. Your attitude toward these lessons is magnified by your students' reception of televised materials. Let us work together for the improvement of our science curriculum.

ABOUT THE TEXTBOOK

This series is correlated with the textbook Science Through Discovery 5 by MacCracken et al. The television lessons have been planned in accordance with the suggested time schedule in the Teacher's Edition of the textbook. As the textbook title suggests, discovery is our approach to science. The more science activities a child can do, the more he can see, touch, and experience, the better his science education will be. Your Teacher's Edition has wonderful suggestions for activities. We hope you will use many of them.

ABOUT THE TEACHER

The instructor for "Safari" is Mrs. June Gueringer, Science Coordinator for the Edgewood Independent School District. She has a B. A. degree from the University of Texas and an M. A. degree from Our Lady of the Lake College. Mrs. Gueringer taught chemistry and general science at Edgewood High School before assuming her present duties. She is vice-president of Theta Beta Chapter, Delta Kappa Gamma Society.

TELEVISION OUTLINE

Channel 7 Tuesdays 9:30,11:30,1:30

Lesson	Date	Title
1	Sept. 17, 1968	Flowering Plants
2	Oct. 1, 1968	Simple Plants
3	Oct. 15, 1968	Sound
4	Oct. 29, 1968	Communications
5	Nov. 12, 1968	Geological Time Table
6	Nov. 26, 1968	Forces Shaping the Earth
7	Dec. 10, 1968	Introduction to Light
8	Jan. 7, 1969	Light
9	Jan. 28, 1969	Communities
10	Feb. 11, 1969	Ponds
11	Feb. 25, 1969	Magnetism
12	Mar. 11, 1969	Electricity
13	Mar. 25, 1969	Water
14	April 15, 1969	Conservation
15	April 29, 1969	The Solar System and Beyond
16	May 13, 1969	The Earth's Nearest Neighbor

OUTLINE SUBJECT TO REVISION

Lesson 1 PLANT STRUCTURES

Purpose: To introduce the structural parts of plants and identify the function of each structure

Vocabulary: photosynthesis

Lesson Outline:

I. Roots

II. Stems

III. Leaves

IV. Flowers

Comments:

Have the students do the flower and food coloring experiment. They will enjoy watching the flower absorb the color. This is a good opportunity for flower and leaf collections.

Textbook correlation:

Science Through Discovery 5, Unit 1

Lesson 2	SIMPLE PLANTS
Purpose:	To develop an awareness of the simple plants
Vocabulary:	thallophyte, bryophyte, algae, fungi

Lesson Outline:

I. Classifying living things

II. Simplest plants

III. Bryophytes

IV. Ferns

Comments:

If one of your students can find a fern with spores on the underside of the fern leaf, you will have a wonderful visual example. Toadstools are interesting also. Food molds are fun to look at if you have a microscope.

Textbook correlation:

Science Through Discovery 5, Unit 1

Lesson 3	SOUND
Purpose:	To introduce the characteristics of sound To give examples of sounds produced by musical instruments
Vocabulary:	vibration, pitch, frequency, percussion

Lesson Outline:

I. Vibrations in matter

II. Frequency

  A. Vibrating objects

  B. Sound waves

III. Pitch

IV. Musical instruments

  A. Percussion

  B. String

  C. Wind

Comments:

Have materials ready for some of the activities described in the textbook. Be sure that you are familiar with the background material in the Teacher's Edition.

Textbook correlation:

Science Through Discovery 5, Unit 2

Lesson 4	COMMUNICATIONS
Purpose:	To show some of the technical aspects of various methods of communicating with others over long distances
Vocabulary:	transmitter, sounder, receiver, radio waves

Lesson Outline:

I. Telegraph

  A. How it works

  B. Making a telegraph

II. Telephone

III. Radio

IV. Television

Comments:

Some of this information is correlated with the textbook but most of it is supplementary. The tin can telephone is a good activity to use as follow-up for this lesson.

Textbook correlation:

Science Through Discovery 5, Unit 2

Lesson 5 GEOLOGICAL TIME TABLE

Purpose: To introduce fossils and the geological time table

Vocabulary: fossils, geological calendar, trilobites

Lesson Outline:

I. Fossils

II. Pre-cambrian

III. Paleozoic

IV. Mesozoic

V. Cenozoic

Comments:

Limestone is particularly rich in fossils. Since we have a considerable amount of limestone in our area, some of your students may have fossils that they can show to their classmates. A diorama of one of the geological eras might be an interesting class project.

Textbook correlation:

Science Through Discovery 5, Unit 3

Lesson 6 FORCES SHAPING THE EARTH

Purpose: To provide background information about the geological events that have acted on the surface of the earth

Vocabulary: weathering, erosion, solution, suspension

Lesson Outline:

I. Building Forces
    A. Volcanoes
    B. Folds
    C. Faults
    D. Earthquakes
II. Wearing forces
    A. Weathering
    B. Erosion
    C. Glaciers

Comments:

We have used the film, "Understanding Our Earth: How Its Surface Changes" in this lesson. Plan to show some of the other appropriate films from our district library as you develop this unit.

Textbook correlation:

Science Through Discovery 5, Unit 3

Lesson 7	INTRODUCTION TO LIGHT
Purpose:	To introduce some of the concepts about light The nature of light, how it travels, and some sources of light are emphasized.
Vocabulary:	theory, beam, ray, wave

Lesson Outline:

I. The nature of light

II. Sources of light

III. Characteristics of light

Comments:

Activities are a must in this unit. Follow the suggestions in the Teacher's Edition for activities. Materials are easy to obtain or make.

Textbook correlation:

Science Through Discovery 5, Unit 4

Lesson 8 LIGHT

Purpose: To continue the development of concepts of light

Vocabulary: refraction, reflection, polarization, concave, convex, laser

Lesson Outline:

I. "Light All About Us"

II. Lenses

III. Polarization

IV. The laser beam

V. Color

Comments:

Have activities concerning the electromagnetic spectrum. The prism activity is a very good one. The structure and function of the human eye is very important also.

Textbook correlation:

Science Through Discovery 5, Unit 4

Lesson 9 COMMUNITIES

Purpose: To learn about the relationships among organisms that live together

Vocabulary: environment, habitat, succession, interdependence, populations

Lesson Outline:

I. Habitats

II. Interdependence

III. Populations

IV. Protection

V. Climax community

Comments:

Divide the class into teams. Have each team examine a small plot of ground about a yard square. Select several different habitats near your school such as an open field, a densely wooded area, a tree covered area, or the bank of a small stream. Teams should make a careful count of all the living things in this small space and report back to the class about the findings. The hay infusion is a good activity if you have a microscope.

Textbook correlation:

Science Through Discovery 5, Unit 5

Lesson 10	POND LIFE
Purpose:	To look at life in a pond and to learn about the interdependence of the various organisms that live there
Vocabulary:	amphibian, algae, microorganism

Lesson Outline:

I. Plant life

II. Animal life

III. Shallow and deep water life

IV. "Life in a Pond"

Comments:

The film "Life in a Pond" is shown in this lesson. If you are interested in using it again, you may obtain it from the district library. Have the students gather information about the relationship between one animal and the other living organisms in its community.

Textbook correlation:

Science Through Discovery 5, Unit 5

Lesson 11 MAGNETISM

Purpose: To learn about the properties of magnets

Vocabulary: lodestone, poles, lines of force, magnetism

Lesson Outline:

I. The earth's magnetic field

II. Magnetic poles

III. Properties of magnets

IV. The compass and magnets

Comments:

This lesson should be considered background material for this unit. Electrical fields and magnetic fields have much in common. No follow-up is necessary unless you want your students to have the experience of working with magnets.

Textbook correlation:

Science Through Discovery 5, Unit 6

Lesson 12 ELECTRICITY

Purpose: To introduce static and current electricity

Vocabulary: electron, static, current

Lesson Outline:

I. Kinds of charges

II. Static electricity

III. Current electricity

  A. Wet cells

  B. Dry cells

Comments:

There are many interesting activities to use as follow-up material for this lesson. Refer to your Teacher's Edition for the supplies you will need for these activities.

Textbook correlation:

Science Through Discovery 5, Unit 6

Lesson 13 **WATER**

Purpose: To make students aware of the importance of clean water to our nation and to motivate them to learn about the water resources of our community and the surrounding territory

Vocabulary: Water table, artesian well, ground water

Lesson Outline:

I. Ground water

II. Water table

III. San Antonio's water supply

Comments:

This would be a good time for some of your students to get information from the City Water Board about our water. It might be interesting for them to secure information about the water supply in Austin or another neighboring city to compare with our system.

Textbook correlation:

Science Through Discovery 5, Unit 7

Lesson 14 CONSERVATION

Purpose: To make the students aware of the importance of conservation and to show them that each person must do his part in conserving the natural resources of our nation

Vocabulary: extinct, selective cutting, contours

Lesson Outline:

I. Soil conservation

II. Water conservation

III. Forest conservation

IV. Protecting our wildlife

Comments:

Many class projects would be appropriate for this topic. Some suggestions are:

1. Find out about conservation practices in your community.
2. Get samples of different soils.
3. Make reports on extinct animals.

Textbook correlation:

Science Through Discovery 5, Unit 7

Lesson 15 THE SOLAR SYSTEM AND BEYOND

Purpose: To introduce some simple concepts of astronomy and to arouse interest in the night sky

Vocabulary: galaxy, light year, astronomy

Lesson Outline:

I. Theories on the beginning of the universe

II. Stars

III. Galaxies

IV. Solar system

V. Light years

Comments:

Be sure to plan some night sky watching activities for your students. After they learn to read star maps, they should be able to sky watch on their own.

Textbook correlation:

Science Through Discovery 5, Unit 8

Lesson 16 The Earth's Neighbor

Purpose: To provide an imaginary trip to the moon that will acquaint students with many of the aspects of space travel and the physical characteristics of the moon

Vocabulary: orbit

Lesson Outline:

I. The preparations

II. A trip to the moon

III. A safe return

Comments:

Children are very interested in space travel both real and imaginary. This is a good time of year to plan activities in which the students have a keen interest to help sustain them through this last month of school. Any current developments in the space program should be discussed at this time.

Textbook correlation:

Science Through Discovery 5, Unit 8

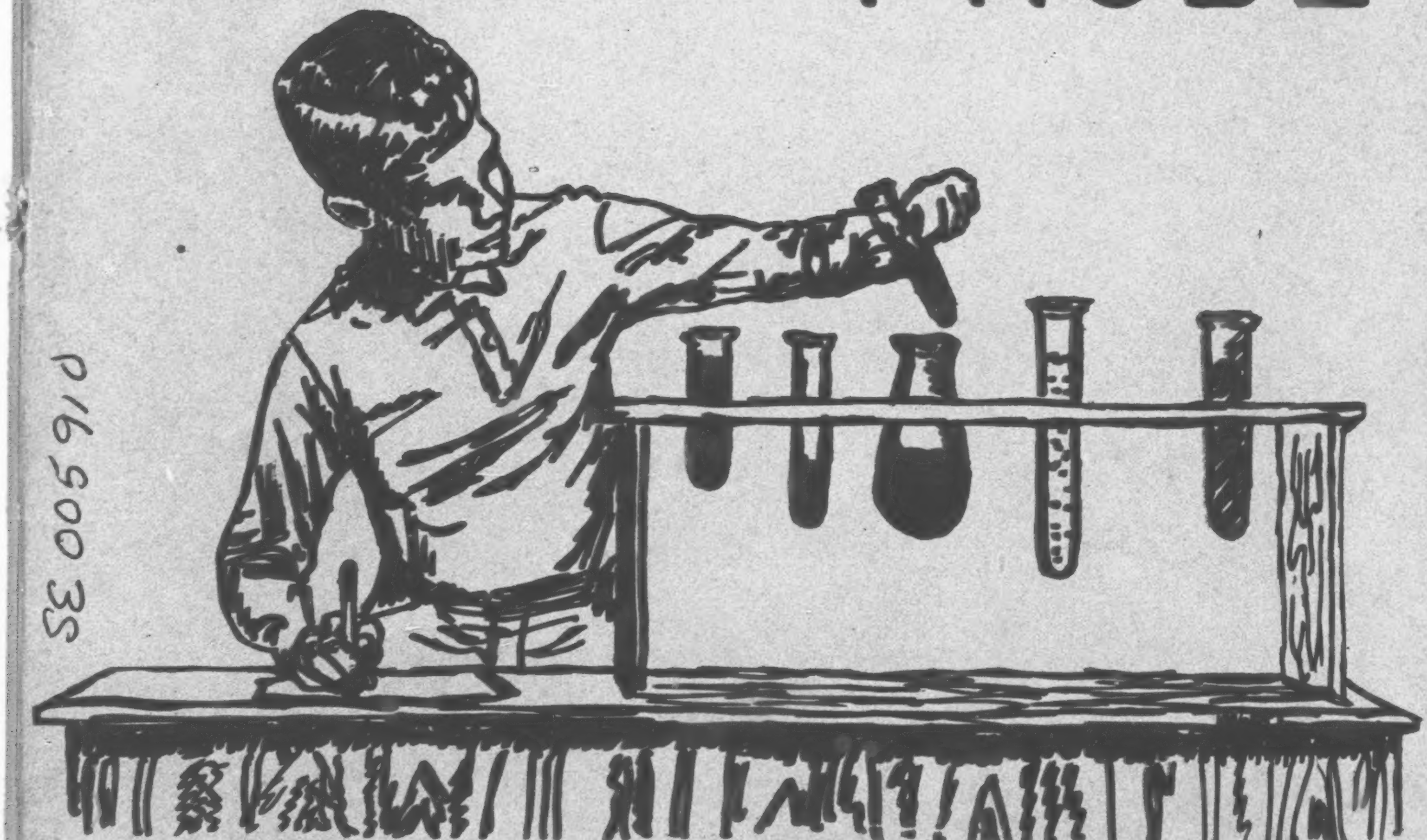
BESE - Title III

EDGEWOOD ISD
INSTRUCTIONAL
TELEVISION
KHS 77

ED0 30556

TEACHER'S
GUIDE — 6

PROBE



SE 005 910

PROBE

TEACHER'S TELEVISION GUIDE

SCIENCE - GRADE 6

EDGEWOOD INDEPENDENT SCHOOL DISTRICT
INSTRUCTIONAL TELEVISION
KHS - 77 - TV

MRS. JUNE GUERINGER, SCIENCE COORDINATOR

COORDINATOR'S MESSAGE

The science television lessons should be an integral part of the science program. In team teaching, it is quite important that we are together in our topics. Both classroom and television lessons will be more meaningful to the students if our lessons are coordinated. We have prepared this outline of television lessons to give advance notice of the topics to be covered. We hope this will help you with your planning.

Please give the lesson outline to your students before they view the lesson. The outline will help them visualize the sequence and relationship of materials in the lesson. It is important for students to take notes during the telecast. At first, note taking may be difficult, but it should be stressed because of the importance of this ability. Please develop a testing program that will encompass the televised materials as well as text materials.

The television instructor will confer regularly with the classroom teachers for the purpose of evaluation and improvement of this program. Any suggestions will be gratefully accepted. With your help, we can make television time a valuable component in the education of our students.

June Gueringer
June Gueringer
Science Coordinator

RESPONSIBILITIES OF THE CLASSROOM TEACHER

BEFORE THE TELECAST:

Turn the receiver on five minutes before the scheduled time. Using the Teacher's Guide, the classroom teacher should give the students a general idea of what will be covered on the telecast.

Arouse the students' interest.

Introduce the subject matter.

Prepare the students for the lesson.

The teacher should set up a receptive atmosphere and adjust the TV receiver for a clear picture and good sound.

DURING THE TELECAST:

The classroom teacher should be in position to watch both the receiver and the students.

Supervise your class closely.

Observe students reactions.

Take notes for personal use.

AFTER THE TELECAST:

The sessions after the telecast should be used to promote enthusiasm and to furnish students an opportunity to perform individually. It is essential that some follow-up be provided.

Lead discussions.

Answer questions.

Explain vocabulary.

Lead into related activities (some of which are listed in the Teacher's Guide).

ABOUT THE SERIES

It is our hope that "Probe" will be an effective audio-visual aid and an integral part of the classroom science program. We have incorporated the same types of experiences in the television lessons that you will find in the textbook. Some activities are experiments while others are discovery or nondiscovery in nature. All are intended to be a catalyst for your classroom activities.

Remember that the classroom teacher is the key to the success of our television program. Your attitude toward these lessons is magnified by your students' reception of televised materials. Let us work together for the improvement of our science curriculum.

ABOUT THE TEXTBOOK

This series is correlated with the textbook Science Through Discovery 6, by MacCracken et al. The television lessons have been planned in accordance with the suggested time schedule in the Teacher's Edition of the textbook. As the textbook title suggests, discovery is our approach to science. The more science activities a child can do, the more he can see, touch, and experience, the better his science education will be. Your Teacher's Edition has wonderful suggestions for activities. We hope you will use many of them.

ABOUT THE TEACHER

The instructor for "Probe" is Mrs. June Gueringer, Science Coordinator for the Edgewood Independent School District. She has a B.A. degree from the University of Texas and an M. Ed. degree from Our Lady of the Lake College. Mrs. Gueringer taught chemistry and general science at Edgewood High School before assuming her present duties. She is vice-president of Theta Beta Chapter, Delta Kappa Gamma Society.

TELEVISION OUTLINE

Elementary

Channel 11 Thursdays 8:45, 10:20, 12:15, 1:45

Lesson	Date	Title
1	Sept. 12, 1968	Building Blocks of Living Materials
2	Sept. 26, 1968	Microorganisms
3	Oct. 10, 1968	Observing and Describing Substances
4	Oct. 24, 1968	Chemical World
5	Nov. 7, 1968	What Shall We Eat?
6	Nov. 21, 1968	Blood
7	Dec. 12, 1968	Controls
8	Jan. 9, 1969	Simple Machines
9	Jan. 30, 1969	Rockets and Satellites
10	Feb. 13, 1969	The Atmosphere
11	Feb. 27, 1969	Weather
12	Marc. 13, 1969	Changing Seasons
13	Mar. 27, 1969	Air Pollution
14	April 17, 1969	The Environment
15	May 1, 1969	Plant and Animal Distribution
16	May 15, 1969	Biological Clocks

Outline subject to change

TELEVISION OUTLINE

Junior High

Channel 11 Fridays 8:45, 10:20, 12:15, 1:45

Lesson	Date	Title
1	Sept. 6 - Jan. 24	Building Blocks of Living Materials
2	Sept.13 - Jan. 31	Microorganisms
3	Sept.20 - Feb. 7	Observing and Describing Substances
4	Sept. 27- Feb. 14	Chemical World
5	Oct. 4 - Feb. 21	What Shall We Eat?
6	Oct. 11 - Feb. 28	Blood
7	Oct. 18 - Mar. 7	Controls
8	Oct. 25 - Mar. 21	Simple Machines
9	Nov. 1 - Mar. 28	Rockets and Satellites
10	Nov. 8 - April 11	The Atmosphere
11	Nov. 15 - April 18	Weather
12	Nov. 22 - May 2	Changing Seasons
13	Dec. 6 - May 9	Air Pollution
14	Dec. 13 - May 16	The Environment
15	Dec. 20 - --	Plant and Animal Distribution
16	Jan. 10 - May 23	Biological Clocks

Outline subject to change

NOTE: Lesson 15 will not be shown the second semester.

Lesson 1 BUILDING BLOCKS OF LIVING THINGS

Purpose: To develop understanding of the basic principles of the cell theory and cell division

Vocabulary: cell membrane, nucleus, cytoplasm, organisms, tissues

Lesson Outline:

I. Cell theory

II. Cell structure

III. Tissues

IV. Organs

V. Living systems

Comments:

We do not want to get too far over the students heads with this topic, but they should be exposed to it.

Textbook correlation:

Science through Discovery 6, Unit 1

Lesson 2	MICROORGANISMS
Purpose:	To develop understanding of the structure of microscopic living things
Vocabulary:	microorganism, bacteria, binary fission, bacteriology, diatom

Lesson Outline:

I. Bacteria

II. Yeasts

III. Algae

IV. Protozoa

V. Protists

Comments:

The students are shown many kinds of microorganisms in this lesson. If you have a microscope, the students should see some microorganisms themselves. Reports on some of the scientists mentioned in this unit is a good activity at this time.

Textbook correlation:

Science through Discovery 6, Unit 1

Lesson 3	OBSERVING AND DESCRIBING SUBSTANCES
Purpose:	To make the students aware of the importance of observation in scientific endeavors
Vocabulary:	properties, solid, liquid, gases, melting point, freezing point, boiling point, soluble, solution, saturated

Lesson Outline:

I. Physical properties

II. States of matter

III. Changes of state

IV. Solubility of substances

Comments:

We hope you will provide some follow up activities. This is good background for chemical changes and chemical compounds. Do not go beyond your students' comprehension when studying atomic structure.

Textbook correlation:

Science through Discovery 6, Unit 2

Lesson 4	CHEMICAL WORLD
Purpose:	To describe some chemical properties To develop some concepts about elements and compounds
Vocabulary:	chemical reaction, crystals, proton, electron, neutron, formula, orbit

Lesson Outline:

I. Chemical properties

II. Crystals

   A. Observing crystals

   B. Growing crystals

III. Elements, atoms, and molecules

   A. Some important elements

   B. Combining elements

   C. Particles in an atom

Comments:

Some of your students may want to grow crystals as projects. Follow the suggestions in your Teacher's Edition for activities.

Textbook correlation:

Science through Discovery 6, Unit 2

Lesson 5 WHAT SHALL WE EAT?

Purpose: To identify food nutrients

Vocabulary: monosaccharide, disaccharide, sucrose, lipids, proteins

Lesson Outline:

I. Carbohydrates

II. Fats

III. Proteins

IV. Vitamins

V. Minerals

Comments:

This is a good time to emphasize a proper diet. Pictures of foods containing specific food nutrients can be combined to show what is necessary for a balanced diet.

Textbook correlation:

Science through Discovery 6, Unit 3

Lesson 6	BLOOD
Purpose:	To learn about the composition and functions of blood
Vocabulary:	plasma, capillary, artery, vein

Lesson Outline:

I. Composition of blood

II. Circulation of blood

III. Heart

IV. Vessels

Comments:

It would be interesting if your students could observe some human blood cells under the microscope.

Textbook correlation:

Science through Discovery 6, Unit 3

2

Lesson 7 CONTROLS

Purpose: To develop concepts about the nervous system and the endocrine glands

Vocabulary: pituitary, thyroid, neuron, reflex arc

Lesson Outline:

I. Neurons

II. Brain

III. Endocrine glands

Comments:

This information is rather difficult. A follow up discussion should clarify any thing the students do not understand about the material presented in the lesson. Have your students check their reflexes according to the instructions on page 128.

Textbook correlation:

Science through Discovery 6, Unit 3

Lesson 8 SIMPLE MACHINES

Purpose: To introduce the simple machine concepts

Vocabulary: fulcrum, effort, load

Lesson Outline:

I. Levers

II. Pulleys

III. Inclined planes

Comments:

This related material is good background information for the topics covered in this unit.

Textbook correlation:

Science through Discovery 6, Unit 4

Lesson 9 ROCKETS AND SATELLITES

Purpose: To describe some of the forces that affect the motion of rockets and satellites

Vocabulary: orbit, momentum, thrust, vector, acceleration

Lesson Outline:

I. Principles of rocketry

II. Satellites

   A. Governing forces

   B. Orbital velocity

Comments:

This is a very interesting topic for children. Although the topics may seem difficult, the students' interest will sustain them through most of it.

Textbook correlation:

Science through Discovery 6, Unit 7

Lesson 10 **THE ATMOSPHERE**

Purpose: To provide information about the atmosphere

Vocabulary: troposphere, stratosphere, ozone

Lesson Outline:

I. The composition of air

II. The structure of the atmosphere

Comments:

This is a good time to see if the concepts of elements and compounds have been retained. The gases of the air include elements and compounds.

Textbook correlation:

Science through Discovery 6, Unit 5

Lesson 11	**WEATHER**
Purpose:	To introduce the concepts of weather and measurements of weather factors
Vocabulary:	circulation, pressure, barometer, thermometer, connection

Lesson Outline:

I. Air pressure

II. Winds

III. Circulation

IV. Temperature

Comments:

This lesson is merely an introduction. You will have to develop each topic in the classroom as your class studies the unit. Plan many activities. Perhaps you can plan a field trip to the weather bureau.

Textbook correlation:

Science through Discovery 6, Unit 5

Lesson 12	CHANGING SEASONS
Purpose:	To develop an understanding of seasonal changes To show the effect of the earth's rotation and revolution on the seasons
Vocabulary:	hemisphere, rotation, revolution, equinox, solstice

Lesson Outline:

I. Characteristics of seasonal change

II. Differences in northern and southern hemispheres

III. Rotation and revolution of the earth

IV. Equinox and solstice

Comments:

Plan some activities for follow up that will emphasize the way climate and position on the earth must be taken into account when man's way of life is considered.

Textbook correlation:

Science through Discovery 6, Unit 5

Lesson 13 AIR POLLUTION

Purpose: To develop an awareness to the problem of air pollution
To make each student think about what he can do to decrease air pollution.

Vocabulary: smog, pollutants

Lesson Outline:

I. Natural pollutants

II. Man made pollutants

III. Smog in the cities

Comments:

This is a very timely topic. While the problem is not severe in our city at this time, it should be considered. It is quite possible that air pollution could be a major problem in our city at some future date. Perhaps your students can find interesting and current articles in magazines and newspapers about what is being done to control air pollution.

Textbook correlation:

Science through Discovery 6, Unit 5

Lesson 14	THE ENVIRONMENT
Purpose:	To develop understanding about the environment
Vocabulary:	ecology, environment, biosphere biotic, abiotic

Lesson Outline:

I. Abiotic environment

II. Biotic environment

III. A changing environment

Comment:

Each kind of plant and animal lives best in a particular place. The physical factors as well as the other living organisms must be considered because all of them affect the life of the organism.

Textbook correlation:

Science through Discovery 6, Unit 7

Lesson 15 PLANT AND ANIMAL DISTRIBUTION

Purpose: To develop understanding about the factors that affect plant and animal distribution

Vocabulary: domestication, barrier, factor, climatic, consumer

Lesson Outline:

I. Geographic factor

II. Climatic factor

III. Biological factors

Comments:

In this lesson, the barriers to the spread of populations are discussed. Try to get many pictures of plants and animals which can be used in leading into the study of adaptations.

Textbook correlation:

Science through Discovery 6, Unit 7

Lesson 16	WELL-ADAPTED ORGANISMS
Purpose:	To develop understanding of characteristics of well-adapted organisms
Vocabulary:	inherit, survival, biological clocks, symbiosis, mutualism, commensalism

Lesson Outline:

I. Adaptive change

II. Biological clocks

III. Symbiosis

Comments:

For follow up, go into the effects of man on the balance of nature.

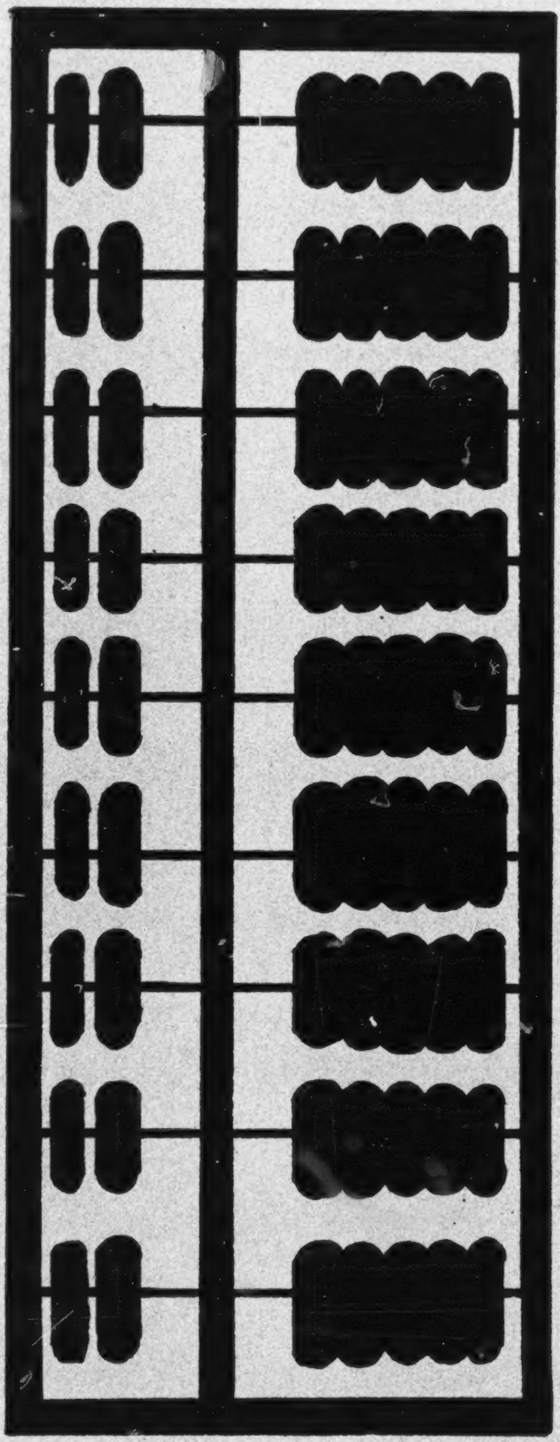
Textbook correlation:

Science through Discovery 6, Unit 7

ED 030556

BESE-Title III

ABACUS



Teacher's Guide-6

EDGEWOOD ISD INSTRUCTIONAL TELEVISION

KHS 77

SE 005 910

ABACUS

TEACHER'S TELEVISION GUIDE
FOR MATHEMATICS - GRADE 6

EDGEWOOD INDEPENDENT SCHOOL DISTRICT
INSTRUCTIONAL TELEVISION
KHS - 77 - TV

MR. EARLE BOLTON, MATH COORDINATOR

YOUR COORDINATOR'S MESSAGE

The lesson outlines that follow are designed to give you an idea of what to expect when a telecast is scheduled for your class. The telelessons are given for the purpose of providing enrichment and coherence for the entire math program and are not, in any way a substitute for what you, the teacher, will do in the classroom.

You are the key to successful learning and the telelessons are only a part of the overall learning situation.

In order to be better prepared for what is going to be discussed on TV please read each outline carefully before air time and where special preparations are required, take care of these necessities before the lesson begins. Your cooperation on this point is especially important, as the instructor will assume that these preparations have been made before he begins.

In some cases it may not be possible to cover all the material listed in the outline. In such cases you should, after the telecast, cover all topics that were ommitted because subsequent lessons may be based on some of this information.

Be sure to keep up to date and pace your class so that you will be discussing the topic that is to be covered on TV at the time it is scheduled. Deviation of a day or so either way will not matter but for maximum success we should all try to be together.

If you have suggestions or criticism, both adverse and complementary, please let us know. Only with your help can we make team-teaching through television a success.

Best of luck for a successful course!

Earle H Bolton
Earle H. Bolton
Mathematics Coordinator

RESPONSIBILITIES OF THE CLASSROOM TEACHER

BEFORE THE TELECAST:

Turn the receiver on five minutes before the scheduled time. Using the Teacher's Guide, the classroom teacher should give the students a general idea of what will be covered on the telecast.

Arouse the students' interest.

Introduce the subject matter.

Prepare the students for the lesson.

The teacher should set up a receptive atmosphere and adjust the TV receiver for a clear picture and good sound.

DURING THE TELECAST:

The classroom teacher should be in position to watch both the receiver and the students.

Supervise your class closely.

Observe students reactions.

Take notes for personal use.

AFTER THE TELECAST:

The sessions after the telecast should be used to promote enthusiasm and to furnish students an opportunity to perform individually. It is essential that some follow-up be provided.

Lead discussions.

Answer questions.

Explain vocabulary.

Lead into related activities (some of which are listed in the Teacher's Guide).

ABOUT THE COURSE

ABACUS is the title given to this series of televised lessons designed for use at the sixth grade level. The telelessons presented in this series are designed to aid the teacher in presenting some of the more obscure and/or difficult topics of the course and are directed toward the average student, although there should be something in every lesson that will appeal to both extremes of the ability scale.

Since it is difficult for the television teacher to allow for individual differences, this is left up to the classroom teacher who is in direct contact with the students.

Many of the topics covered in ABACUS are those that have been suggested by successful sixth grade teachers throughout the district. We have attempted to incorporate as many of these teachers' suggestions as possible and are indebted to them for their honest and valued appraisal of the course.

Page numbers, which appear in the upper right hand corner of the pages in this guide represent the approximate place in the text where each class should be during the week indicated. The pace of the course, as dictated by the TV schedule, was determined after a year of trial and represents the pace that has been followed by several successful teachers.

ABOUT THE TEXT

The text outline for this TV series is Arithmetic 6, by McSwain, Brown, Gundlach and Cooke (Laidlaw Bros., 1965). All page numbers and chapter headings refer to this text.

ABOUT THE TEACHER

Earle H. Bolton is coordinator of mathematics for the Edgewood Independent School District of San Antonio, Texas. He was a classroom teacher at the Edgewood High School for seven years and has taught mathematics for both high ability and low level students. Mr. Bolton received his B.S. Degree from the Georgia Institute of Technology in 1954 and his M.S. in mathematics from Trinity University in 1965.

TELEVISION OUTLINE

Channel 11

Time: 8:55, 10:25,
12:20, 1:55

Lesson Number	Date	Topic
1.	9/5/68	Introduction, Comparing Numbers, Symbols
2.	9/19/68	Review of Addition
3.	10/3/68	Fractions
4.	10/17/68	Division of Whole Numbers, Word Problems
5.	10/31/68	More on Division, Introduction to Multiplication of Fractions
6.	11/14/68	Multiplication and Division of Fractions
7.	12/5/68	Some Interesting Facts about Mathematics
8.	12/19/68	Units of Measure
9.	1/23/69	Solving Word Problems
10.	2/6/69	Addition and Subtraction of Decimals
11.	2/20/69	Division of Decimals
12.	3/6/69	Ratio and Proportion
13.	3/20/69	Introduction to Percent
14.	4/10/69	Applications of Percent
15.	4/24/69	Geometry I
16.	5/8/69	Geometry II

ALL TELECASTS ON THURSDAY. OUTLINE SUBJECT TO REVISION.

Lesson I   Introduction - Basic Concepts
Pages 1-20

Objective: To introduce the series, provide motivation for viewing the telecasts and establish some fundamental definitions.

Lesson Outline

I. Introduction

   A. General comments on the course
   B. What is expected of the students

II. Introduction to decimals and fractions

   A. Comparing fractions
   B. Equivalent fractions

III. The meaning of various signs and symbols in mathematics.

Comments:

Please prepare your students for each telecast by giving them a brief outline of what to expect from the lesson. The topics listed in this guide (above) will be almost exactly what will be covered. Also, please have your students prepare themselves for taking notes during the telecast by having pencils, paper and textbooks handy during each program.

Lesson II A Review of Addition and Subtraction

Pages 21-32

Objective: To provide a general review of the operations of addition and subtraction of whole numbers.

Lesson Outline

I. Review of addition of whole numbers

II. The associative property of addition

III. Inverse operations

IV. The fact that subtraction is not associative

Comments:

The properties of our number system are very important and should be emphasized. Many students will discover the properties and their applications for themselves. Some, however, will not be able to see through these characteristics without a detailed explanation, so do not hesitate to tell them about the commutative and associative laws if they fail to discover them within a reasonable length of time.

Lesson III   Fractions   Pages 33-56

Objective: To review the fundamental processes of adding and subtracting fractions.

Lesson Outline

I. Addition and subtraction of fractions

  A. Common denominators
  B. Finding the lowest common denominator

II. Review of the multiplication tables

  A. Multiplication by zero
  B. The distributive property for multiplication over addition
  C. The associative property
  D. Factors

Comments:

Quite a bit of review may be necessary here as many of our students are weak in their use of fractions. Emphasize the fact that the rational numbers (fractions) represent a new set of numbers. Therefore, the rules for combining them are different than those for combining whole numbers (we need to get common denominators, etc.).

Lesson IV Division Pages 57-65

Objective: To review short division.

Lesson Outline

I. Shortcuts when multiplying by numbers ending in zero

II. The various parts of a division problem

III. The concept of closure

IV. Short division

V. The process of long division and its applications

VI. Averages

Comments:

Long division is one of the areas of greatest emphasis in our text. This is the first of two lessons covering this important topic.

Lesson V More On Division - Introduction To Fractions Pages 66-85

Objective: To review long division and discuss the process of multiplying fractions.

Lesson Outline

I. Review of division

II. Introduction to multiplication of fractions by using the number line

   A. Mixed expressions
   B. Changing from mixed numbers to improper fractions and back again

Comments:

Please remember that this outline is subject to revision in order to meet the needs of the classroom teachers. If we are moving too rapidly or too slowly, please do not hesitate to tell us.

Lesson VI Multiplication and Division of
Pages 86-112

Objective: To discuss some of the commonly used short cuts in multiplying and dividing fractions and why they work.

Lesson Outline

I. The use of cancellation in multiplying and dividing fractions

II. Division of fractions

  A. Proper

  B. Improper

  C. Mixed

III. Reciprocals - The inverse for multiplication

Comments:

This might be a good place to review and emphasize the fact that multiplying by a fraction whose numerator is one is the same thing as dividing by the denominator. For example: 1/4 X 12 is the same as 12 ÷ 4. Some students may find that they enjoy having the option of doing either operation and getting the same correct answer.

Lesson VII Some Interesting Facts About Mathematics

Objective: To motivate the students and give a chance for review or optional work.

Lesson Outline

I. A motivational lesson on some of the uses of mathematics and how math affects our lives. Several shortcuts and topics of general interest will be discussed. Since we are not making any forward progress in the text, this week may be used for catching up if necessary.

Lesson VIII   Measurement   Pages 113-130

Objective: To discuss denominate numbers and their uses. To discuss conversion from one unit to another.

Lesson Outline

I. Units of measure

   A. Weight

   B. Length

II. Conversion of units - Liquid and dry measure

III. Time - The twenty-four hour clock

IV. Operations on denominate numbers

   A. Adding and subtracting measures

   B. Multiplying and dividing measures

Comments:

Practice on whole numbers and fractions can be integrated into this lesson easily by giving such measures as 1/4 pound, 1/2 gallon, 3/4 pint, etc.

We feel that a certain amount of review is necessary throughout the course. However, review can always be included as a part of a new lesson, thus we can continue to make forward progress each week and still use a "spiral approach" to learning.

Lesson IX Solving Word Problems Pages 131-145

Objectives: To emphasize the need for careful reading and accurate interpretation of word problems.

Lesson Outline

I. Solving word problems

The solution of several selected story problems and a demonstration of the importance of proper reasoning when working a word problem.

Comments:

Here is an ideal place to make mathematics meaningful. Story problems demonstrate mathematics usefulness as a tool for the scientist, engineer, business man and housewife. Develop this lesson in your follow up activities so that each student will realize that by knowing and using mathematics, he can perform his daily tasks more easily. Dramatize the word problems for deeper meaning. If the problem deals with distance, bring a tape measure to class. If it deals with transportation, a model car or airplane sets the stage for discussion. Make the problem visual and physical so the students can become involved with learning the processes of solving it.

Most of our students shy away from word problems because they have trouble understanding the meaning of the words. By making the problems fun, some of this fear can be overcome. Even a little humor can make working word problems interesting and profitable.

Lesson X Decimals Pages 147-170

Objective: To review decimal operations through multiplication.

Lesson Outline

I. Decimal fractions

  A. Addition and subtraction of decimals

  B. Multiplication of decimals

  C. The use of the distributive law in multiplication of decimals

II. Rounding off decimals

  A. The necessity of rounding off

  B. Repeating decimals

Comments:

A recent survey has shown that placement of the decimal point in multiplication problems has been an area of major weakness with our students. While this process seems obvious to us as teachers, it may not make so much sense to the students. Perhaps we need some more drill here!

Lesson XI Division of Decimals Pages 171-186

Objective: To justify the rules for decimal placement in a division problem.

Lesson Outline

I. Division of decimals

  A. Justification of the rules for division of decimals

II. Changing fractions to decimals and back again

III. Using the concept of denominate numbers to establish the division of a decimal by a whole number.

IV. Short cuts for dividing by multiples of 10

Lesson XII   Ratio and Proportion   Pages 187-206

Objective: To introduce the concept of a proportion and show how proportions can be used.

Lesson Outline

I. Ratio and proportion
    A. Definition of ratio
    B. Ratios must be comparisons of like quantities
    C. Definition of a proportion

II. Solving proportions by getting like denominators

III. Applications of ratio and proportion - Maps and scale drawings

IV. Means and extremes in a proportion

Comments:

Proportions can be used to solve a large number of mathematical situations. To show the usefulness of proportions, one needs only to look in any high school science book to see the numerous formulas that turn out to be simple variations (or proportions, if you prefer). The old problem of "halving" or "quartering" a recipe can be done by proportions. They're quite useful.

Lesson XIII Introduction to Percent Pages 207-222

Objective: To define and discuss the concept of percent.

Lesson Outline

I. Introduction to percent

  A. Definition and history of percent

II. Changing decimals to percent

III. Changing fractions to percent by using proportions

IV. The formula Base X Rate = Percentage

  A. Solving problems by using percent

  B. Some practical applications of percent

Comments:

The section on percent is very important. This is probably the most used topic in mathematics as far as most of our students are concerned. Every one of them will have to possess a working knowledge of percent in order to figure income tax, sales tax, etc. Much of our society operates by using the principles discussed in this section.

Lesson XIV Applications of Percent Pages 223-238

Objective: To show some of the useful applications of percent, especially those related to the business world.

Lesson Outline

I. Applications of percent - A study of some of the various ways we use percent in business
    1) Taxes
    2) Discount
    3) Commission

II. Finding the percentage when given the base and the rate

III. The possibility of using the percentage formula to find other parts, such as the rate or base

Lesson XV Geometry I Pages 289-261

Objective: To introduce some of the basic concepts of geometry. To demonstrate how geometric figures are classified.

Lesson Outline

I. Introduction to geometry
   A. Meaning of the word "geometry"
   B. A brief history of geometry

II. Lines, rays line segments and their proper notation

III. Angles - Classification

IV. Planes

V. Closed figures
   A. Polygons
      1) Triangles
      2) Quadrilaterals
   B. Circles

VI. Finding the perimeter of a polygon

VII. Definition of perimeter

VIII. Finding the area of rectangles and squares

IX. Difference between area and perimeter

Comments:

This is the first of two lessons on geometry. Usually, the students like this topic and it is possible to cover a lot of really deep mathematics in this section.

Lesson XVI Geometry II Pages 262-277

Objective: To discuss volume as a natural extension of area through a third dimension. To introduce graphical representations.

Lesson Outline

I. Volume

   A. Finding the volume of a rectangular solid

   B. The volume of a cube as an extension of the formula for a rectangular solid

   C. Volumes of other geometric solids

II. Graphical representation

   A. Why we have graphs .... some examples

   B. A brief study of the various types of graphs

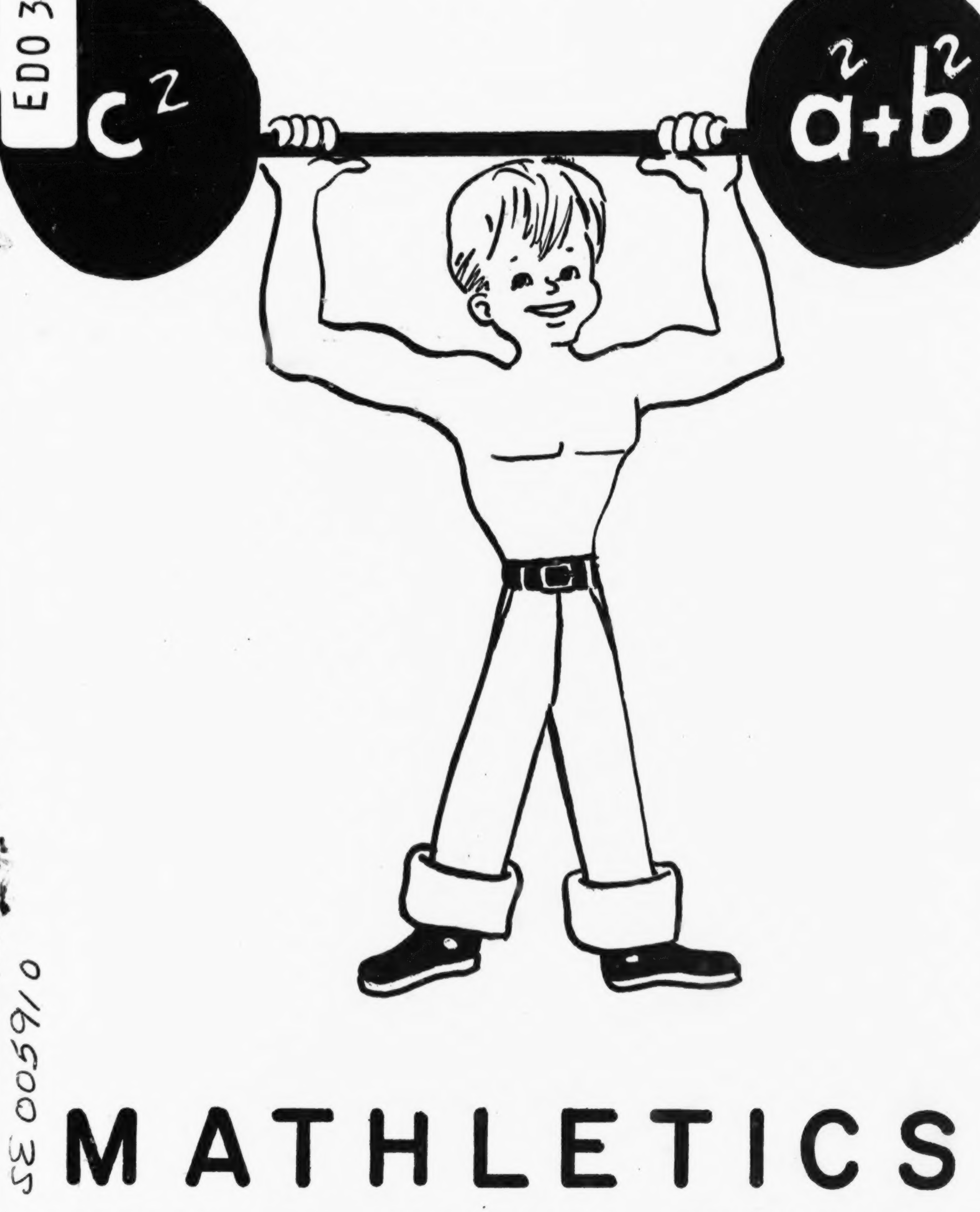
Comments:

You will notice that the television materials cover the text through page 277. It is possible that you may be able to cover some of the remaining parts of the text before the end of the year. Do not feel that you are required to stop when the TV series stops, as we want our students to receive as much instruction in mathematics as possible.

Now that the television season is over, we would appreciate your honest evaluation of the course, the instructor and the materials covered. We also need your hints and suggestions. Please send your evaluations and comments to the television studio at the John F. Kennedy High School.

ED 030556

BESE-Title III



MATHLETICS

EDGEWOOD ISD INSTRUCTIONAL TELEVISION KHS 77

Teacher's Guide - 7

SE 005 910

MATHELETICS

TEACHER'S TELEVISION GUIDE
FOR MATHEMATICS - GRADE 7

EDGEWOOD INDEPENDENT SCHOOL DISTRICT
INSTRUCTIONAL TELEVISION
KHS - 77 - TV

MR. EARLE BOLTON, MATH COORDINATOR

YOUR COORDINATOR'S MESSAGE

The lesson outlines that follow are designed to give you an idea of what to expect when a telecast is scheduled for your class. The telelessons are given for the purpose of providing enrichment and coherence for the entire math program and are not, in any way a substitute for what you, the teacher, will do in the classroom.

You are the key to successful learning and the telelessons are only a part of the overall learning situation.

In order to be better prepared for what is going to be discussed on TV please read each outline carefully before air time and where special preparations are required, take care of these necessities before the lesson begins. Your cooperation on this point is especially important, as the instructor will assume that these preparations have been made before he begins.

In some cases it may not be possible to cover all the material listed in the outline. In such cases you should, after the telecast, cover all topics that were ommitted because subsequent lessons may be based on some of this information.

Be sure to keep up to date and pace your class so that you will be discussing the topic that is to be covered on TV at the time it is scheduled. Deviation of a day or so either way will not matter but for maximum success we should all try to be together.

If you have suggestions or criticism, both adverse and complementary, please let us know. Only with your help can we make team-teaching through television a success.

Best of luck for a successful course!

Earle H Bolton
Earle H. Bolton
Mathematics Coordinator

RESPONSIBILITIES OF THE CLASSROOM TEACHER

BEFORE THE TELECAST:

Turn the receiver on five minutes before the scheduled time. Using the Teacher's Guide, the classroom teacher should give the students a general idea of what will be covered on the telecast.

Arouse the students' interest.

Introduce the subject matter.

Prepare the students for the lesson.

The teacher should set up a receptive atmosphere and adjust the TV receiver for a clear picture and good sound.

DURING THE TELECAST:

The classroom teacher should be in position to watch both the receiver and the students.

Supervise your class closely.

Observe students reactions.

Take notes for personal use.

AFTER THE TELECAST:

The sessions after the telecast should be used to promote enthusiasm and to furnish students an opportunity to perform individually. It is essential that some follow-up be provided.

Lead discussions.

Answer questions.

Explain vocabulary.

Lead into related activities (some of which are listed in the Teacher's Guide).

ABOUT THE COURSE

MATHELETICS is the title given to this television series in mathematics, grade 7. This course is designed to meet the needs of students who will probably be entering algebraically oriented courses on the high school level. The emphasis is on pre-algebra mathematics, although several short sections on informal geometry are included.

The telecasts in this series will be fifteen minutes in length and will be broadcast twice a week on Tuesdays and Fridays. Obviously, with such a short time devoted to each telelesson, the TV instructor can introduce topics and give a general overview only. It is hoped that the classroom teacher will take the materials presented over the air and build a lesson or series of lessons around them.

You will find that some weeks will have only one telelesson instead of the usual two. This will occur when the day of the telecast falls immediately before or after a long holiday period, during the week of mid-semester exams and in specific instances when it is felt inadvisable to begin a new topic. These periods may serve as "catch up" sessions since no foward progress in the course will be made during these times.

The pace of the course must, of necessity, be dictated by the television guide. Please plan ahead so your class will be studying the topic or pages listed in the guide. Only this way can the TV lessons be of value to your students.

ABOUT THE TEXT

The text for MATHELETICS is School Mathematics I by Eicholtz et. al. (Addison-Wesley: 1967) All page numbers and topic headings refer to this text.

ABOUT THE TEACHER

Earle H. Bolton is coordinator of mathematics for the Edgewood Independent School District of San Antonio, Texas. He was a classroom teacher at the Edgewood High School for seven years and has taught mathematics for both high ability and low level students. Mr. Bolton received his B.S. Degree from the Georgia Institute of Technology in 1954 and his M.S. in mathematics from Trinity University in 1965.

TELEVISION OUTLINE

Channel 11

Time: 8:55, 10:25, 12:20, 1:55

Lesson Number	Date	Topic
1	Sept. 6	Introduction to Sets
2	Sept. 10	Exponents
3	Sept. 13	Rounding Numbers and Estimation
4	Sept. 17	The Octal System
5	Sept. 20	Inverse Operations
6	Sept. 24	The Function Machine
7	Sept. 27	Graphing a Function
8	Oct. 1	Elementary Properties
9	Oct. 4	The Distributive Law
10	Oct. 8	Introduction to Geometry
11	Oct. 11	Congruency
12	Oct. 15	Perimeter
13	Oct. 18	Area
14	Oct. 22	Voluma
15	Oct. 25	Fundamental Operations
16	Oct. 29	Exponential Notation
17	Nov. 1	Division
18	Nov. 5	Averages

19	Nov. 8	Word Problems
20	Nov. 12	More on Problem Solving
21	Nov. 15	Number Theory
22	Nov. 19	Prime and Composite Numbers
23	Nov. 22	Greatest Common Factor
24	Nov. 26	Least Common Multiple
25	Dec. 3	Congruency
26	Dec. 6	Ruler and Compass
27	Dec. 10	Angles
28	Dec. 13	Triangles
29	Dec. 17	Angular Measure
30	Jan. 10	Area Formulas
31	Jan. 14	Volume Formulas
32	Jan. 21	Sets and Subsets
33	Jan. 24	Fractions
34	Jan. 28	The Rational Numbers
35	Jan. 31	Unequal Fractions
36	Feb. 4	Addition and Subtraction of Fractions
37	Feb. 7	Least Common Denominator
38	Feb. 11	Adding Mixed Expressions

39	Feb. 18	Multiplication of Fractions
40	Feb. 21	The Basic Properties
41	Feb. 25	The Distributive Property and Rational Numbers
42	Feb. 28	Division of Fractions
43	Mar. 4	Rational Number Functions
44	Mar. 7	Parallel Lines
45	Mar. 11	Classification of Quadrilaterals
46	Mar. 18	The Angles of A Triangle
47	Mar. 21	Using Formulas
48	Mar. 25	The Pythagorean Theorem
49	Mar. 28	Decimals
50	Apr. 1	Multiplication of Decimals
51	Apr. 11	Scientific Notation
52	Apr. 15	Estimating and Rounding Off Decimals
53	Apr. 18	Dividing Decimals
54	Apr. 22	Fractions to Decimals and Back Again
55	Apr. 29	Ratio and Proportion
56	May 2	Scale Drawings

57	May 6	Introduction to Percent
58	May 9	Applications of Percent
59	May 13	Circles
60	May 16	Area and Circumference of a Circle

TELECASTS ON TUESDAYS AND FRIDAYS

OUTLINE SUBJECT TO REVISION

Lesson 1 Introduction to Sets and Numbers
Pages 1-7

Objective: To introduce the series and discuss sets and set operations

Lesson Outline

I. Introductory comments and reminders

II. Sets

    A. Definition of a set

    B. Classification of sets

    C. Simple set operations

        1. Union

        2. Intersection

Comments:

The operations of union and intersection of sets are usually reserved until a later course for discussion (Algebra I). However, we feel that these two simple set operations will provide a foundation that will be valuable later in THIS course, thus, they are introduced in this first telecast. Interested students may wish to do some research on sets and set operations. These make excellent topics for oral reports for the class.

Lesson 2 Exponents Pages 8-12

Objective: To justify the laws of exponents for multiplication and division

Lesson Outline

I. Exponents as a compact way of writing factors. The basic definition of a power

II. The laws of exponents for multiplication

III. The laws of exponents for division

IV. Writing large numbers as powers of ten

Comments:

The method described in IV, above, is useful in writing large numbers such as distances between planets, numbers of atoms in a particular substance and sizes of national debts.

Lesson 3 Rounding Numbers and Estimation

pages 13-17

Objective: To discuss rounding numbers in order to estimate sums, differences, etc.

Lesson Outline

I. Rounding large numbers

II. Approximations

  A. Ages

  B. Weights

III. Estimating the size of a sum by rounding the addends

Comments:

Rounding an arithmetic problem and getting an estimate of the answer is useful in determing whether the answer attained by computation is reasonable or not. It serves as a mental check on our calculations.

Lesson 4 The Octal System Pages 18-26

Objective: To discuss the nature of the base eight number system

Lesson Outline

I. What we mean by the base eight system
    A. Some of the differences between base 8 and base 10
    B. Changing from one base to another

II. Computing in base eight
    A. Addition
    B. Subtraction

Comments:

The reasons for studying base eight are twofold. First, some computers operate in a base 8 system. Second, a study of bases other than base 10 enables one to appreciate and understand our normal base 10 better.

Do not strive for computational skill in base 8, but rather concentrate on base 10. Studying different bases gives an interesting diversion, however, and should strengthen our students' knowledge of all systems in mathematics. There is no reason to feel restricted to base 8 just because the TV guide includes only this one. Any base, such as base 5, base 11, etc. can make a good exercise.

Lesson 5 Inverse Operations Pages 35-41

Objectives: To discuss the solution of simple equations by the method of inverses

Lesson Outline

I. Solving equations by the "undo" method

II. The four fundamental axious of equality

III. Solution of a few selected equations

Comments:

Proficiency in solving simple linear equations is absolutely necessary to success in mathematics. Almost everything we will do for the rest of this year will depend on the ability to solve equations.

Lesson 6 The Function Machine Pages 42-44

Objective: To demonstrate the concept of a function in mathematics

Lesson Outline

I. The concept of a function

II. The "function machine"

III. Some functional computations

Comments:

Our text uses the "function machine" to illustrate a very important concept of mathematics. The definition of a function is: A set of ordered pairs of numbers, such that for every single value of the first variable, there is one and only one value of the second variable. While this definition is somewhat deep, you might keep it in mind while explaining functions.

Graphing functions is basic to the graphing of equations, which comes in Algebra I. We will study graphing next time.

Lesson 7 Graphing a Function Pages 45-49

Objective: To introduce students to the idea of locating points in space

Lesson Outline

I. Making a grid

II. Locating a point that is determined by a pair of numbers

II. Graphing some patterns by number

Lesson 8 Elementary Properties Pages 50-57

Objective: To discuss the properties of comutativity and associativity. To review the properties of zero and one.

Lesson Outline

I. An illustration of the meaning of the commutative property

$$a + b = b + a$$

$$a \cdot b = b \cdot a$$

II. An illustration of the meaning of the associative property

$$a + (b + c) = (a + b) + c$$

$$a \cdot (b \cdot c) = (a \cdot b) \cdot c$$

III. The zero property

A. For addition $a + o = a$

B. For multiplication $a \cdot o = o$

IV. The property of one for multiplication

$$a \times 1 = a$$

Comments:

You will probably recognize the zero property for addition as the IDENTITY for addition and the property of one for multiplication as the MULTIPLICATIVE IDENTITY. It's all right to call these numbers identities, provided the students have a solid definition of what we mean by an identity. The telelesson will merely point out some of the facts about using zero and one but will not go into technicalities.

Lesson 9 The Distributive Law Pages 58-68

Objective: To discuss the principle involved with the use of the distributive property

Lesson Outline

I. A discussion of the distributive property for multiplication over addition

$$a\,(b + c) = a\,b + a\,c$$

$$3\,(b + c) = 3\,b + 3\,c$$

$$3\,(5 + 4) = 15 + 12$$

II. Factoring - the reverse of the distributive property

   A. Short cuts for multiplication

   B. Working with fractions

Comments:

The distributive law holds for multiplication over subtraction (which is simply adding a negative) also. Some good thought questions for your class are:

1. Does the distributive property hold for addition over multiplication?
2. Does the distributive property hold for subtraction over multiplication?

The answer to both questions is "no", but several experiments of substitution into the general forms may be necessary before any conclusion can be inferred. The general form for 1 above, is

$$a + (b \cdot c) = (a + b) \cdot (a + c)$$

and for 2 , above, is

$$a - (b \cdot c) = (a - b) \cdot (a - c)$$

Be sure and have your students substitute different values for a, b, and c, and do not use zero or one for any value.

Lesson 10 Introduction to Geometry Pages 69-79

Objective: To introduce some of the basic concepts of the study of geometry

Lesson Outline

I. Underfined terms

   A. Point

   B. Line

   C. Plan

II. Sufficient conditions for determining a plane

   A. Three noncollinear points

   B. A point and a line

   C. Two parallel lines

   D. Two intersecting lines

Comments:

Most of the information in this lesson is in definition or descriptive form. There is little computing involved. The idea here is to provide some back ground for the study of metric geometry later in the chapter. Metric geometry does involve calculation and will depend on the definitions and concepts that we establish today.

Lesson 11 Congruency Pages 80-84

Objective: To define and discuss the concept of congruency

Lesson Outline

I. Definition and illustration of congruent figures

II. Congruent line segments

III. Two important geometric ideas

  A. The whole is equal to the sum of its parts

  B. Halves of equals are equal

Comments:

The concept of congruent line segments corresponds to the idea of congruent triangles that we studied in high school geometry. We used to say that corresponding parts of congruent triangles are EQUAL. There's nothing really wrong with this statement today, even though the text prefers to call these corresponding parts CONGRUENT instead of EQUAL. The argument for using the newer notation is a question of semantics and not mathematics. Use either form of the statement.

Lesson 12 Perimeter Pages 85-90

Objective: To discuss measurement and perimeter

Lesson Outline

I. Measurement and measuring devices

II. Perimeter of plane figures

  A. Square

  B. Rectangle

  C. Triangle

Comments:

The concept of perimeter is usually quite easy for our students and can usually be covered quite rapidly. You can review computational skills in this section by giving a lot of drill in finding perimeters, especially when you make the dimensions fractions, decimals, or give them in different units.

Lesson 13 Area Pages 91-94

Objective: To discuss the calculation of area for plane figures

Lesson Outline

I. Square units

II. Area of plane figures

   A. Rectangle

   B. Square

   C. Triangle

III. Solid Figures

   A. Lateral area

   B. Total surface area

Comments:

Surface area problems can be made more meaningful by extending the problems to include the cost of painting the object if a gallon of paint will cover a certain number of square feet and paint costs a given number of dollars per gallon. Here's some practical mathematics that does not involve any high powered techniques-just simple arithmetic.

Lesson 14 Volume Pages 95-99

Objective: To discuss volume as a natural extension of area

Lesson Outline

I. Volume of solid figures

  A. Definition and concept

  B. Cubic units

II. Volume of :

  A. Rectangular solid

  B. Cube

Comments:

You can easily supplement this lesson by letting your students find the volume of some irregular solid figures. Just nail or glue some shapes together and let your students measure them. Then take these dimensions and compute the volume. This gives a practical, physical application of mathematics that appeals to most of the students.

Lesson 15 Fundamental Operations Pages 103-112

Objective: To review the operations of addition, subtraction and multiplication

Lesson Outline

I. Fundamental operations
   - A. Addition - carrying
   - B. Subtraction - Borrowing
     - 1. Expanded notation
     - 2. Regrouping as "borrowing"
   - C. Multiplication - using expanded notation and the distributive property

Comments:

This lesson is simply a review and is given mainly to supplement the practice that you are giving your students in the classroom. There is nothing new here- just a few helpful hints to remind the students what they're doing when they borrow, carry, etc.

Lesson 16 Exponential Notation Pages 113-115

Objective: To demonstrate the meaning and use of exponents and exponential notation

Lesson Outline

I. Exponential notation

   A. Definition

   B. The various parts of a number in exponential form

   C. Special names for the second and third power of a number

II. The meaning of the first power of a number (n^1).

III. The laws of exponents for multiplication.

IV. The laws of exponents for division

Lesson 17 Division Pages 116-117

Objective: To review the division algorithm

Lesson Outline

I. A review of the process of long division

  A. Estimating in finding the answer

  B. What to do with remainders

II. Checking a division problem

Comments:

Note the few pages we are covering in this lesson. Our foward progress is being purposefully slowed to enable you to catch up and/or give additional practice in division and other fundamental operations. Drill your students well on division. They need all the practice they can get!

Lesson 18 Averages Pages 118-122

Objective: To discuss the process of finding the arithmetic mean

Lesson Outline

I. The meaning of an average

   A. Why we need averages

   B. The teacher and the process of finding a student's grade

II. The process of finding the average of a group of numbers

III. Finding missing terms when you know the average and all terms but one

Lesson 19 Word Problems Pages 123-128

Objective: To dramatize and demonstrate the solution of a few selected word problems

Lesson Outline

I. Some hints in solving stated problems

   A. Read carefully

   B. Select a letter for the unknown or part of the unknown

   C. Try to set up an equation or inequality

   D. Solve the equation

   E. Check the solution (s) by seeing if it (they) satisfy all the conditions of the problem

II. The solution of a few examples

Comments:

This is the first in a series of two lessons on word problems. In the first lesson our emphasis will be on reading and general directions on the set up of a word problem. The second lesson will be more specific and will include a discussion of how and why we check word problems.

Lesson 20 More on Problem Solving Pages 129-135

Objective: To emphasize logic in solving problems

Lesson Outline

A continuation of the previous lesson on solving word problems with emphasis on checking and evaluating the answer. An effort will be made to dramatize each problem with visuals to help explain what is happening as the problem is set up for solution.

Lesson 21 Number Theory Pages 137-141

Objective: To give some background concerning the study of numbers

Lesson Outline

I. A brief history of the theory of numbers

II. Odd and even numbers - the general form

III. Addition and multiplication tables for the set containing the elements O and E (odd and even).

IV. Factors and factoring

Comments:

Number theory is a very old and very interesting branch of mathematics. Here is a good opportunity to include some of the history of mathematics and mathematicians. For additional information see Cajori: A History of Mathematics.

Lesson 22 Prime and Composite Numbers
Pages 142-144

Objective: To demonstrate how to differentiate between prime and composite numbers

Lesson Outline

I. Prime numbers defined
    A. Divisibility
    B. The number one excluded as a prime
    C. Some typical primes
    D. The Sieve of Eratosthenes

II. Composite numbers

III. Prime factorization

Comments:

Students usually have very little difficulty in recognizing primes. This is one of our strongest areas in mathematics, according to a recent series of standardized tests.

The Sieve of Eratosthenes is a very old device, first devised by the ancient Greeks. Eratosthenes was a real person, but it is doubtful if the so called "sieve" is his invention. Often mathematical discoveries are attributed to individuals who had very little to do with them. Eratosthenes, however, was a mathematician and probably was familiar with the sieve method of finding primes

For further information on primes and mathematical history see A History of Mathematics, by F. Cajori.

Lesson 23 Greatest Common Factor
Pages 145-146

Objective: A discussion of how to find the G.C.F

Lesson Outline

I. Prime factorization

II. The use of powers to express repeated factors ($12= 3x2^2$)

III. The process of finding the G.C.F.

IV. A set of rules for finding G.C.F.

Lesson 24 Least Common Multiple Pages 147-151

Objective: A discussion of how to find the L.C.M. and a comparison with the method of finding the G.C.F.

Lesson Outline

I. General definition of L.C.M.

II. The process of finding the L.C.M.

III. A comparison of the method of finding the L.C.M. with that of finding the G.C.F.

IV. Some divisibility rules

Comments:

The divisibility rules that are covered in this telelesson will enable your students to reduce almost any number of reasonable size. There are divisibility rules for other primes such as 7, 11, 13, etc. but these become quite complicated and cumbersome. Most any text on number theory will state these divisibility rules if you are interested in them. For additional information on GCF and LCM, see Oré: Number Theory and its History, which is available in the math office.

Lesson 25 Congruency Pages 153-159

Objective: To discuss some of the fundamental propositions of informal geometry

Lesson Outline

I. Underfined terms and their necessity

  A. Words and expressions from everyday life that are difficult to define

  B. Undefined terms in geometry

    1. Point

    2. Line

    3. Ray

    4. Plane

II. The meaning of congruency

Comments:

To avoid some of the confusion that usually arises from a study of formal geometry, we have chosen the simplest demonstration of all for congruency; that of superimposition. This means that a pair of geometric shapes are said to be congruent if one could be picked up, placed (superimposed) on top of the other and the one on top would fit exactly with the one on the bottom.

There are mathematicians who would argue that "picking up" a geometric shape is not a legal operation and that a series of transformations should be used. This may be all right for someone studying college geometry and perhaps the idea of making transformations is more mathematically perfect, but at this stage of the game we're trying to make our communication as simple as possible.

Therefore, we have taken the easy way out in defining congruence in terms of superimposition.
NOTE: Students will need compasses for the next lesson.

Lesson 26 Rules and Compass Constructions
Pages 160-163

Objective: To demonstrate how to perform simple constructions by using only a compass and a straightedge

Lesson Outline

I. A bit of history about constructions

II. Some basic constructions

   A. Copying a line segment

   B. Copying an angle

   C. Bisecting an angle

Comments:

These constructions are basic to the study of geometry. Each student should be able to perform these constructions efficiently. The lesson on TV will be conducted as a laboratory exercise with students performing in the classroom along with the teacher on TV. Please make sure each student has a compass and ruler before the telecast begins.

We have a filmstrip in the math office: Ruler and Compass Constructions, which gives a complete lesson on this topic. The filmstrip is in full color and has a teacher's guide.

3

Lesson 27 Angles Pages 163-168

Objective: To define and discuss the various types of special angles that are common in geometry

Lesson Outline

I. Classification of angles
  A. Acute
  B. Right
  C. Obtuse
  D. Straight
  E. Reflex

II. Complementary and Supplementary Angles

III. Right angles and perpendicular lines

Comments:

Many interesting problems can be developed from this lesson. The relationship between complementary and supplementary angles is easy to learn and interesting to most students. For some challenging stated problems see Geometry Plane and Solid by Brown and Montgomery (Laidlaw Bros: 1963) Page 37.

Lesson 28 Triangles Pages 169-174

Objective: To demonstrate the sufficient conditions for showing congruency in triangles

Lesson Outline

I. A demonstration of copying a triangle by using a ruler and compass

II. Comments on the sufficiency of these constructions for showing congruency

Comments:

Congruency in triangles can also be demonstrated by using a side and any two angles. (AAS) Three ≅ angles can guarantee similarity between a pair of triangles but not congruency. Right triangles can be shown ≅ by having the hypotenuse (long side) and leg of one triangle ≅ the hypotenuse and leg of another. Right triangles can also be proved congruent by the hypotenuse and any acute angle of one ≅ the hypotenuse and acute angle of another. Your students might be interested in a discussion of these facts. Students will need to buy a protractor for the next telelesson.

Lesson 29 Angular Measure Pages 175-179

Objective: To show how angles are measured by using a protector

Lesson Outline

I. How angles are measured. A discussion of degrees- minutes and seconds

II. The relationship between the number of degrees in an angle and the central angle of a circle

III. The use of a protractor in measuring angles-demonstration

Comments:

We usually feel that all our students will know how to use a simple instrument like a protractor. In fact, they usually do NOT - since many have never used one before. Therefore, we can remedy this situation by having each student purchase one and use it under the teacher's supervision.

Protractors in varying forms make up some of the parts of a transit; an instrument used extensively in surveying, map making, etc. To further motivate your class you might discuss the operation of a transit,or possibly the process of running a survey. For reference see Surveying by Davis and Foote. (Not avalable in the district libraries, but available in any college library and, of course, in the public library.)

Lesson 30 **Area Formulas** Pages 180-183

Objective: To review the definition of area and demonstrate some formulas for finding area

Lesson Outline

I. Review of the definition of area

II. The formula for the area of a :

  A. Rectangle

  B. Square

  C. Triangle

III. Irregular areas

Comments:

The concept of area should not be new to your students. Therefore this lesson will serve as a general review. You will probably want to enrich this lesson by providing for some additional drill in finding areas. Additional exercises may be found in Mathematics 8 by McSwain (the previously adopted text for the 8th grade course) on pages 210, 211, 213, and 214.

Lesson 31 Volume Formulas Pages 184-191

Objective: To give a general review of the concept of volume and some exercises involving the volume formulas

Lesson Outline

I. A review of the concept of volume

II. Some formulas for volume

  A. Rectangular solid (prism)

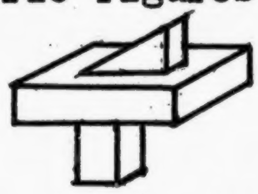
  B. Cube

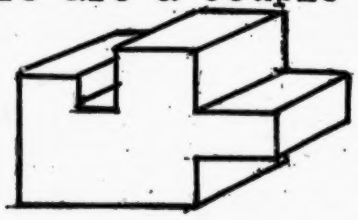
  C. Triangular solid (triangular prism)

  D. Irregular solids

Comments:

As a follow up to this lesson, you might let your students actually find the volume of a few "objects" by measuring them with a ruler, finding the necessary dimensions and calculating the volume. Such "objects" should be of irregular shape, yet be composed of some of the standard geometric figures. Here are a couple of ideas:





Such objects can be made by simply nailing a few blocks of wood together. Several of these can be passed around the class for a comparitive measurement. This gives the students a chance to feel the geometric shapes and feel the concept of volume as well as actually practice measurement. Thus, we appeal to another sense, as well as the usual senses of sight and sound.

Lesson 32 Sets and Subsets Pages 193-196

Objective: To discuss the relationship of subsets to sets as a prelude to the study of fractions

Lesson Outline

I. Definition of a set

  A. Finite sets

  B. Infinite sets

II. Subsets

  A. Definition

  B. Cardinal number relationships

III. Fractional parts of a whole

Comments:

Our purpose in this lesson is twofold. First, we want to define and discuss the concepts of sets and subsets which will be basic to further study of set operations. Second, we want to lay a foundation for the study of fractions by using a subset as a part of something. The usual explanation for a fraction is given by slicing up a pie and showing one of the slices as $\frac{1}{4}$, $\frac{1}{2}$ etc. This constitutes a geometric explanation. By using sets we are doing exactly the same thing, only we are attempting to give the concept an algebraic explanation. Both ways of explaining fractions are correct and proper. If the set idea fails to get the message across, the pie slicing method is just as good!

Lesson 33 Fractions Pages 197-201

Objective: To discuss equivalence in fractions and review reducing fractions

Lesson Outline

I. Equivalent fractions - how to determine equivalence

II. Making fractions that are equivalent - reducing

  A. Partial reduction

  B. Reducing to lowest terms

Lesson 34 The Rational Numbers
Pages 202-206

Objective: To discuss fractions as a new set of numbers- the Rational Numbers

Lesson Outline

I. The number line

   A. The space between zero and one

   B. Division of the number line into fractional parts

II. Equivalence relationships on the number line, such as:

$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8}$, etc.

III. Cross products to demonstrate equal fractions.

Lesson 35 Unequal Fractions Pages 207-214

Objective: To discuss fractional inequalities

Lesson Outline

I. The number line

   A. The relative position of various fractions on the number line

   B. Greater than - less than relationships using cross multiplication

II. The order of rational numbers

Comments:

We are attempting to lay a good foundation for computing with rationals in the next chapter. It is felt that some of our students' difficulties in adding and subtracting fractions springs from the fact that they are weak in their knowledge about the nature of fractional numbers. Therefore, we have spent quite a bit of time on what amounts to a section on "fractional orientation" before attempting to compute with them.

Lesson 36 Addition and Subtraction of Fractions Pages 217-221

Objective: To furnish a brief review of the processes of adding and subtracting rational numbers

Lesson Outline

I. Using the number line to show addition with like denominations

II. The general case for adding with like denominators:

$$\frac{a}{b} + \frac{c}{b} = \frac{a + c}{b}$$

III. Unlike denominators - the necessity of finding a common denominator

IV. The general case:

$$\frac{a}{b} + \frac{c}{d} = \frac{a\,d + b\,c}{b\,d}$$

V. "Borrowing" in subtraction

Comments:

Here is where we usually have to slow down for our sutdents as their background in fractional operations is often weak. Move very slowly and deliberately through this material as it is very important.

Lesson 37 Least Common Denominators
Pages 222-225

Objective: To discuss two methods of finding common denominators

Lesson Outline

I. Using the product of the individual denominators

$$\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{b\,d}$$

II. Prime factorization as a means of finding the LCD

   A. The desirability of finding the least common denominator

   B. Using the least common multiple

   C. A review of finding the LCM

Comments:

This lesson serves as a good review of LCM from an earlier chapter. It also provides a good review of prime numbers.

Lesson 38 Adding Mixed Expressions
Pages 226-229

Objective: To show how to combine mixed expressions by use of the fundamental properties of real numbers

Lesson Outline

I. Mixed expressions and improper fractions

II. The solution of a typical mixed expression
For example:

$$3\frac{1}{4} + 2\frac{1}{2}$$

  A. Associating the whole numbers together and the fractional parts together

$$3 + \frac{1}{4} + 2 + \frac{1}{2} = (3+2) + (\frac{1}{4} + \frac{1}{2})$$

  B. Addition of each parenthetical expression

$$5 + (\frac{1}{4} + \frac{2}{4}) = 5 + (\frac{3}{4})$$

  C. Final simplification of the problem

$$5 + \frac{3}{4} = 5\frac{3}{4}$$

III. Solution of several problems to illustrate the process of addition

Comments:

The process of adding that is demonstrated in this lesson is for explanation and clarification purposes only. Most students will quickly develop short cuts for many of the steps and should be encouraged to do so. It's a good idea to insist on including "all the proper steps" as long as most of the class will follow them without complaining, but when most of the students are anxious to omit obvious steps, don't tie them down. When a process becomes so obvious to a student that he wants to omit it, he is ready to take a short cut. It is my opinion that many a budding mathematician has been discouraged by teachers who have insisted on repeated steps in the solution of a problem that the student could see through.

You may omit pages 230-231 unless there is extra time on your hands. The next lesson will begin on pages 232.

Lesson 39 Multiplication of Fractions
Pages 232-234

Objective: To show how to find the product of two rational numbers

Lesson Outline

I. Multiplication as repeated addition

II. The process of multiplying fractions

$$\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd}$$

III. Short cuts in multiplication (cancellation) and why they work.

Lesson 40 The Basic Properties Pages 235-240

Objective: To provide a review of the fundamental properties of the real number system, using fractions as an illustration

Lesson Outline

I. The fundamental properties using fractions

   A. Closure

   B. Commutative property

   C. Associative property

   D. Identity

   E. Inverse- reciprocal

Comments:

The distributive property, an important property for the rational numbers, will be discussed in the next lesson.

Lesson 41 The Distributive Property and Rational Numbers Pages 241-244

Objective: To show how the distributive property can be used in computation with rational numbers

Lesson Outline

I. The distributive property

  A. What it shows

  B. The general form

II. Using the distributive property to solve some simple fractional problems:

$$5 \times 7\frac{4}{5} = 5\left(7+\frac{4}{5}\right) = 5 \cdot 7 + 5 \cdot \frac{4}{5}$$

III. Selected exercises using the distributive property

Comments:

The distributive property states that if you have a choice of multiplying a sum, then adding the products or adding first, then multiplying, you may do either and arrive at the correct answer PROVIDED you "distribute" the multiplication over the addition:

$$a(b+c) = \overset{\curvearrowright}{a(b+c)} = ab+ac$$

This is very important. When our students begin to progress into high school math, they will use the distributive property often. This law also forms a basis for factoring when used in reverse:

$$ab+ac = a(b+c)$$

It is important for our students to be able to recognize the distributive property when used either "forward" or "backward".

Lesson 42 Division of Fractions Pages 245-251

Objective: To justify the "invert and multiply" rule for dividing rational numbers

Lesson Outline

I. Complex fractions and their meaning

II. A derivation of the rule of inversion by using a complex fraction

  A. Multiplying by one, in any form

  B. Making the denominator equal to one

III. Concluding remarks and an example of using the rule.

Comments:

The purpose of this lesson is simply to show that there is a reason for the rule of "invert and multiply", when dividing fractions. Do not expect your students to master the derivation that is given in this telelesson. It is given for demonstration purposes only.

Lesson 43 Rational Number Functions
Pages 252-261

Objective: To provide some practice and examples of how to use functional notation in solving problems

Lesson Outline

The solution of several problems, stated in functional notation, with comments on each. See the text- pages 252-255 for specific references

Comments:

This is a good time to let your students practice what they've been taught about fractions and fractional operations. Our students usually need a lot of drill in this area.

Lesson 44 Parallel Lines Pages 263-269

Objective: To discuss the nature and use of parallel lines and to state the Parallel Postulate, giving an interpretation of its meaning to geometry

Lesson Outline

I. Definition of parallel lines
  - A. Some examples of parallelism
  - B. Skew Lines

II. Uses of parallel lines in the world about us

III. The Parallel Postulate of Euclid and what it implies to the study of geometry

Comments:

Euclid's parallel postulate stood as the basis for plane geometry for years. In an attempt to reduce the number of postulates to a minimum and to "prove" this mathematical statement, a Russian mathematician by the name of Lobachevsky showed that the Parallel Postulate was not necessary in order to have a well defined geometric system. In "defying" Euclid's Fifth Postulate, as the Parallel rule is sometimes called, Lobachevsky set the stage for what we call non-Euclidean geometry today.

A filmstrip entitled, The Parallel Postulate, is available at the math office. It is in full color and has a complete teacher's guide.

Lesson 45 Classification of Quadrilaterals

Pages 270-272

Objective: To define and discuss the parallelogram as a basin for the study of several quadrilaterals that can be classified as special cases of the parallelogram

Lesson Outline

I. Characteristics of quadrilaterals

II. The parallelogram

  A. Characteristics

  B. Figures that are also parallelgrams

    1. Rectangle

    2. Rhombus

    3. Square

Comments:

In formal geometry the study of the parallelogram is quite detailed. This is because the parallelogram is the "general case" of the rectangle and square, two of our most commonly seen geometric figures.

Lesson 46 The Angles of a Triangle

Pages 273-279

Objective: To demonstrate that the sum of the measure of the interior angles of a triangle equals 180 degrees

Lesson Outline

I. A review of some of the facts about parallel lines and transversals

II. A brief proof that the sum of the angles of a triangle equals 180 degrees

III. Some intuitive demonstrations that the statement in II, above, is true, using rectangles, squares, etc.

IV. Solution of a few examples using the facts above

Lesson 47 Using Formulas Pages 279-284

Objective: To demonstrate the use of formulas in solving problems

Lesson Outline

I. The nature of a formula - how it is derived

  A. Letters used for words

  B. Substitution into formulas

II. A demonstration of how to use some common formulas, with emphasis on area and volume

Comments:

This section of the text actually deals with area and volume. However, since we've already discussed these topics on TV, and since our students need some help in the use of formulas, we have this lesson devoted strictly to them.

You may wish to give some additional drill here, as this is one topic that is used over and over on the higher levels of mathematics.

Lesson 48 The Pythagorean Pages 285-291

Objective: To discuss the formula

$c^2 = a^2 + b^2$ on an informal basis

Lesson Outline

I. Right triangles and the relationship that exists between the sides

II. The formula $c^2 = a^2 + b^2$ and what it means

III. Square root

IV. Proving that a triangle has a right angle in it by using the formula

Comments:

The proof of this important theorem is left until later years. In this course we are only attempting to familiarize our students with the facts of the theorem, not to prove it.

This is a good place to digress into the area of perfect squares, irrational numbers, etc., if you feel that your students can comprehend these topics.

Lesson 49 Decimals Pages 295- 303

Objective: To review decimal notation and discuss addition and subtraction of decimals

Lesson Outline

I. Decimals as fractions

  A. Fractions involving powers of ten

  B. Names of the various decimal places

II. Addition and subtraction of decimals

  A. Lining up the decimal point and why we do it

  B. "Borrowing" in subtraction

Comments:

Most of our students have little difficulty here, so you may be able to cover these pages quickly.

Lesson 50 Multiplication of Decimals
Pages 304-309

Objective: To discuss the reasons for decimal point placement in the product of a multiplication problem

Lesson Outline

I. Fractions whose denominators are powers of ten, such as $\frac{2}{10}$, $\frac{3}{100}$, $\frac{14}{1000}$, etc.

II. Multiplying fractions with denominators that are powers of ten

$$\frac{3}{10} \times \frac{4}{100} = \frac{12}{1000}$$

A. Writing the problem in decimal notation:

$.3 \times .04$

B. Placing the decimal point in the answer:

$.3 \times .04 = .012$

III. A rule for decimal placement

Comments:

Please emphasize multiplying decimals and give your students a lot of drill on this subject. Recent standardized testing has shown that our students are weak in this area.

Lesson 51 Scientific Notation Pages 310-313

Objective: To discuss exponential notation and powers of ten as a useful tool in working with large and small numbers

Lesson Outline

I. Writing numbers such as 100; 1000; 10,000; etc. as powers of ten

II. Writing decimal values as powers of ten

III. The general concept of scientific notation

   A. Changing from regular notation to scientific notation

   B. Changing back to regular notation from scientific notation

IV. Multiplying, using scientific notation

V. The law of exponents for multiplication

Comments:

Here is another area where one can practice on the multiplication and division tables. The telecast will cover only multiplying by using powers of ten. However, it is expected that the classroom teacher will follow up with a discussion of division, as well as give some practice on working with this useful concept.

Lesson 52 Estimating and Rounding Off Decimals Pages 314-318

Objective: To show how to get a close approximation by rounding off

Lesson Outline

I. Guessing and estimating

  A. Making an "educated guess"

  B. The necessity of rounding in order to get good estimates

II. The rules for rounding numbers

III. Some practice at rounding decimals

Lesson 53 Dividing Decimals Pages 319-324

Objective: To demonstrate the three cases of dividing where decimals are involved

Lesson Outline

I. Division of decimals - the three cases:

A. A decimal divided by a whole number

B. A decimal divided by a decimal

C. A whole number divided by a decimal

II. Adding zeros to the right of a decimal and to the left of a whole number

Comments:

We need to spend quite a bit of time in this section. For additional practice problems, see Mathematics 7, by McSwain, et al; pages 348-349. This is the text that was in adoption before the present one. Your school will probably have several copies on hand. If not, check with the math office.

If your students seem to grasp division of decimals unusually well and you need some "time filler", go into the section on the Metric system (pages 324-327). The next telelesson, however, will begin on page 328 with changing fractions to decimals.

Lesson 54 Fractions to Decimals and Back Again Pages 328-341

Objective: To demonstrate how to change a fraction to a decimal and a decimal to a fraction

Lesson Outline

I. Changing fractions to decimals by division

II. Changing terminating decimals to fractions

III. Changing repeating, non-terminating decimals to fractions

IV. Decimals that cannot be changed to fractions

Comments:

In section IV, above, we are discussing irrational numbers, although you need not call them that. All we're trying to do is give some background for a full discussion of irrationals later. Some of the techniques discussed in this lesson are not in the book. The reason they are included in this or any telelesson is to stimulate thought. Students are not expected to master every technique that is discussed on TV.

Lesson 55 Ratio and Proportion Pages 343-352

Objective: To define and discuss the concepts of ratio and proportion and to show the usefulness of these concepts

Lesson Outline

I. Definition of a ratio

  A. A comparison of like quantities

  B. Ways of expressing a ratio

II. Proportions

  A. Definition

  B. Ways of expressing proportions

  C. Means and extremes

III. Solving simple proportion problems by using the rule that, "The product of the means equals the product of the extremes".

Comments:

Be sure that your students are able to solve simple proportions by cross multiplication. However, emphasize the fact that cross multiplication can be done "legally" only when there is a proportion (two fractions that equal each other).

Lesson 56 Scale Drawing Pages 353-357

Objective: To demonstrate the practical application of proportion to scale drawings

Lesson Outline

I. A look at a blue print

II. Some problems taken from the blue print, using the scale that is given

III. Map reading

Comments:

This lesson is given for the purpose of demonstrating the practicality of mathematics. Of all the areas we will study this year, this topic and the topic of percent are probably the most important from a practical standpoint. Make the most of this opportunity to show some real meaning to the subject you teach. Wherever possible show the students that this mathematics business is important and practical stuff! Maybe after a few months, they'll begin to believe you and stop asking the constant question, "What are we going to use this for?" It's worth a try!

Lesson 57 Introduction to Percent Pages 358-364

Objective: To define percent and show how to change from fraction to decimal to percent and back again

Lesson Outline

I. Definition of percent

  A. Percent means hundredth

  B. A historical note on percent

II. Making a percent out of a decimal

III. Making a percent out of a fraction by using a proportion

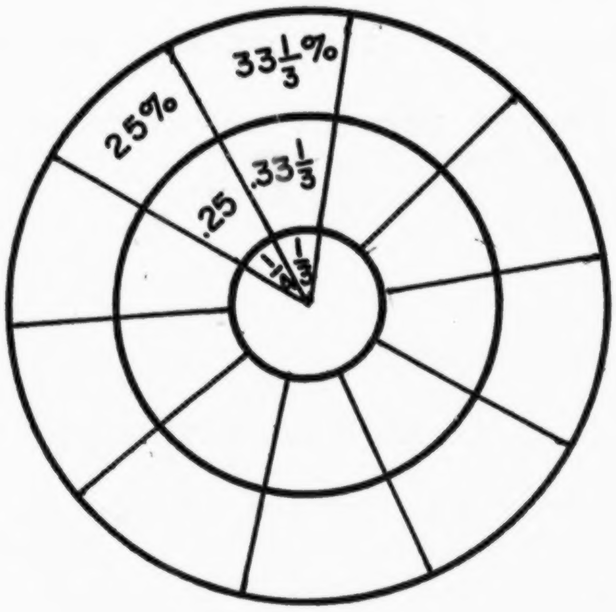
IV. Changing the form- In this section we will attempt to give some drill in finding the other two forms of a fraction if one form is given:

Fraction	Decimal	Percent
$\frac{1}{5}$	—	—
—	.02	—
—	—	75%

Given a value in any column, the student should be able to fill in the other two.

Comments:

Much practice is needed in this lesson; especially the type found in section IV, above. There are all sorts of motivational devices for getting students to practice mathematics. One of the easiest gadgets that can help develop skill in the area of decimal and percent conversion is composed of three concentric wheels joined in the center by a pin or brad:



The wheels can be made of cardboard, poster board or what have you. The center circle contains a set of fractions which are to be matched with a set of decimals on the second wheel and a set of percents on the third. By rotating the various wheels, a student can match up the correct form of a given value.

For complete, detailed plans for making such a device, contact the math office. If you prefer, however, you might experiment with one of your own.

Lesson 58 Applications of Percent Pages 365-373

Objective: To show the practicality of learning about percent

Lesson Outline

I. Some practical applications of percent

   A. Interest

   B. Using the formula I = prt

   C. Proper notation when using the formula

      1. Time must be in years

      2. The rate must be either a fraction or a decimal

   D. Some applications of interest

II. Other applications

Comments:

The purpose of this lesson is to demonstrate some of the practical uses for mathematics. Often our students ask, "Why are we studying this stuff?" Here is a perfect opportunity to give them some answers to that questions.

Lesson 59 Circles Pages 377-390

Objective: To discuss some of the important characteristics of circles

Lesson Outline

I. The definition of a circle

II. Various parts of a circle

   A. Angles and arcs

   B. Chords

   C. Tangents

   D. Secants

   E. Radius and diameter

III. Circumscribed and inscribed polygons

Comments:

Most of this section is informational in nature and requires few calculations. Thus, the rapid pace of going through this section. You may want to just touch the high points of these pages in the text.

Lesson 60 Area and Circumference of a Circle Pages 391-398

Objective: To introduce the concepts of circumference and area of circles and to discuss the number Pi

Lesson Outline

I. The nature of the circumference of a circle

II. The number, Pi - approximations

III. The formula for finding circumference, $C=\pi d$

   A. Variations on the formula using the radius $C=2\pi R$

   B. Solution of a problem on circumference

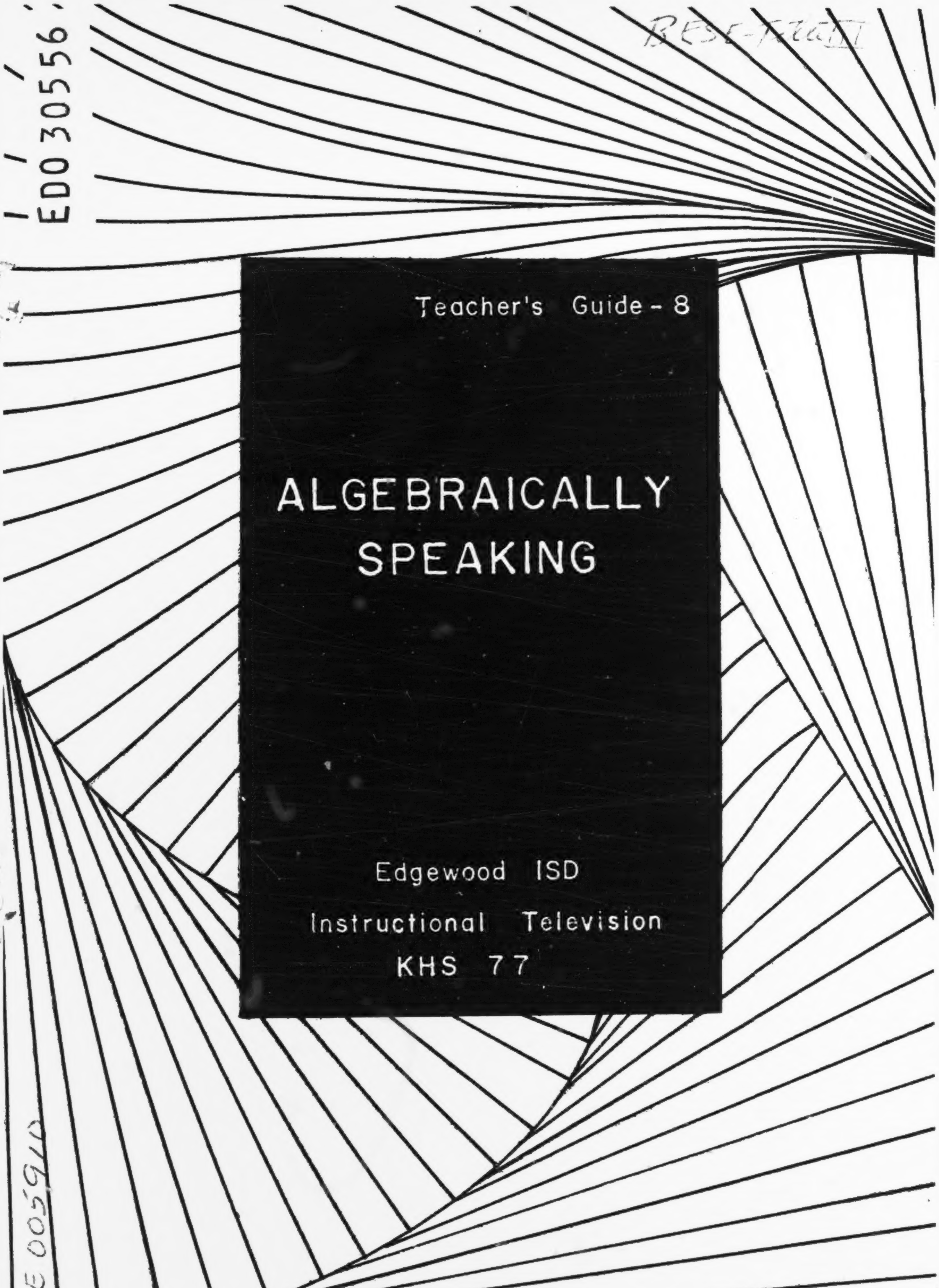
IV. The area of a circle- approximation

Comments:

This is the last telelesson in this series, but should by no means be the end of your course. No doubt you will want to spend more time on circular areas, perimeters, etc. If time permits, you will probably want to take your class into Chapter 13, which is on signed numbers; especially if your class is capable and interested. In the case of slower sections, you might want to spend these last weeks in general review of the course. The fact that the telelessons do not cover chapter 13 does not mean that this material is unimportant. It will be covered again in the 8th grade, however, and the 7th grade course will not suffer if it is omitted.

ED030556

BESE-Ttl III



Teacher's Guide - 8

ALGEBRAICALLY SPEAKING

Edgewood ISD
Instructional Television
KHS 77

SE 005910

ALGEBRAICALLY SPEAKING

Teacher's Guide

for Mathematics Grade 8

Edgewood Independent School District
Instructional Television
KHS - 77 - TV

EARLE H. BOLTON MATHEMATICS COORDINATOR

ABOUT THE COURSE

ALGEBRAICALLY SPEAKING is the title given to this television series in mathematics, grade 8. This course is designed to meet the needs of students who will probably be entering algebraically oriented courses on the high school level. The emphasis is on pre-algebra mathematics, although several short sections on informal geometry are included.

The telecasts in this series will be fifteen minutes in length and will be broadcast twice a week on Mondays and Thursdays. Obviously, with such a short time devoted to each telelesson, the TV instructor can introduce topics and give a general overview only. It is hoped that the classroom teacher will take the materials presented over the air and build a lesson or series of lessons around them.

You will find that some weeks will have only one telelesson instead of the usual two. This will occur when the day of the telecast falls immediately before or after a long holiday period, during the week of mid-semester exams and in specific instances where it is felt unadvisable to begin a new topic. These periods may serve as "catch up" sessions since no forward progress in the course will be made during these times.

The pace of the course must, of necessity, be dictated by the television guide. Please plan ahead so your class will be studying the topic or pages listed in the guide. Only this way can the TV lessons be of value to your students.

ABOUT THE TEXT

The text for ALGEBRAICALLY SPEAKING is School Mathematics II by Eicholtz et. al. (Addison-Wesley: 1967) All page numbers and topic headings refer to this text.

ABOUT THE TEACHER

Earle H. Bolton is coordinator of Mathematics for the Edgewood Independent School District of San Antonio, Texas. A classroom teacher at the Edgewood High School for seven years, he has taught mathematics for both high ability and low level students. Mr. Bolton received his B.S. degree from the Georgia Institute of Technology in 1954 and his MS in mathematics from Trinity University in 1965.

RESPONSIBILITIES OF THE CLASSROOM TEACHER

BEFORE THE TELECAST:

Turn the receiver on five minutes before the scheduled time. Using the Teacher's Guide, the classroom teacher should give the students a general idea of what will be covered on the telecast.

Arouse the students' interest.

Introduce the subject matter.

Prepare the students for the lesson.

The teacher should set up a receptive atmosphere and adjust the TV receiver for a clear picture and good sound.

DURING THE TELECAST:

The classroom teacher should be in position to watch both the receiver and the students.

Supervise your class closely.

Observe students reactions.

Take notes for personal use.

AFTER THE TELECAST:

The sessions after the telecast should be used to promote enthusiasm and to furnish students an opportunity to perform individually. It is essential that some follow-up be provided.

Lead discussions.

Answer questions.

Explain vocabulary.

Lead into related activities (some of which are listed in the Teacher's Guide).

OUTLINE

Channel 11	Mondays and Thursdays	9:15,10:50 12:45, 2:15

Lesson Number	Date	Title
1	Sept. 9	History of Numeration
2	Sept. 12	The Octal System
3	Sept. 16	The Binary System
4	Sept. 19	Integers
5	Sept. 23	Subtraction of Integers
6	Sept. 26	Multiplication and Division of Integers
7	Sept. 30	Combining Integer Operations
8	Oct. 4	Absolute Value
9	Oct. 7	Graphing Integers
10	Oct. 10	Introduction to Geometry
11	Oct. 14	Angles and Polygons
12	Oct. 17	Area
13	Oct. 21	Volume
14	Oct. 24	An Introduction to Number Theory
15	Oct. 28	Prime and Composite Numbers
16	Oct. 31	Greatest Common Factor
17	Nov. 4	Least Common Multiple
18	Nov. 7	Introduction to Rational Numbers

Lesson Number	Date	Title
19	Nov. 14	Addition and Subtraction of Fractions
20	Nov. 18	Multiplication and Division of Fractions
21	Nov. 21	Negative Rationals
22	Dec. 2	Congruency
23	Dec. 5	Congruent Triangles
24	Dec. 9	Angular Measure
25	Dec. 12	Decimals
26	Dec. 16	Multiplication and Division of Decimals
27	Jan. 9	Rounding Decimals
28	Jan. 13	Laws of Exponents
29	Jan. 20	Scientific Notation
30	Jan. 23	Repeating Decimals
31	Jan. 27	Ratio and Proportion
32	Jan. 30	Scale Drawings
33	Feb. 3	Physics
34	Feb. 10	Introduction to Percent
35	Feb. 13	More on Percent
36	Feb. 17	The Parallel Postulate
37	Feb. 20	Polyhedra
38	Feb. 24	Proportions and Parallel Lines

Lesson Number	Date	Title
39	Feb. 27	Similar Triangles
40	Mar. 3	The Pythagorean Theorem
41	Mar. 6	Two Special Cases of the Pythagorean Theorem
42	Mar. 10	Irrational Numbers
43	Mar. 17	The Square Root Algorithm
44	Mar. 20	Square Root by the "Average" Method
45	Mar. 24	Decimal Approximations for Square Roots
46	Mar. 31	Statistics
47	April 10	Measures of Central Tendency
48	April 14	Circles and Spheres
49	April 17	Arcs and Angles
50	April 21	The Mysterious Number, Pi
51	April 24	The Area of a Circle
52	April 28	Cylinders
53	May 1	Pre-Algebra Mathematics
54	May 5	Properties
55	May 8	Solution of Word Problems
56	May 12	Review of Absolute Value
57	May 15	Graphing Equations

Lesson 1 Introduction and History of Numeration Pages 1-15

Objective: To introduce the course and discuss early numeration systems

Lesson Outline

I. General Comments on the course

II. Early numeration systems

   a) Primitive man

   b) Binary counting

   c) The Egyptian numeration system

   d) The Romans and their system of numeration

III. Hindu - Arabic Numerals

IV. The number - numeral concept - The difference between number and numeral

V. Calculating machines

   a) Abacus

   b) Electric calculator

   c) Electronic computer

VI. A puzzle to fit the think exercise on p. 5 of the text

ASNEE GTTSS OUTNZ

ODAOZ DEKTZ

Lesson 2 The Octal System Pages 16-20

Objective: To discuss the nature of the base eight number system

Lesson Outline

I. What we mean by the base eight system

   a) Some of the differences between base 8 and base 10

   b) Changing from one base to another

II. Computing in base eight

   a) Addition

   b) Subtraction

Comments:

The reasons for studying base eight are twofold. First, some computers operate in a base 8 system. Second, a study of bases other than base 10 enables one to appreciate and understand our normal base 10 better.

Do not strive for computational skill in base 8 or in base 2 (next time on TV), but rather concentrate on base 10. Studying different bases gives an interesting diversion, however, this should strengthen our students' knowledge of all systems in mathematics. There is no reason to feel restricted to bases 8 and 2 just because the TV guide includes only these two. Any base, such as base 5, base 11, etc. can make a good exercise.

Lesson 3 The Binary System Pages 21-33

Objective: To discuss the binary number system and some of its applications

Lesson Outline

I. The binary system - what it is

II. Changing from base 10 to base 2

III. Fundamental operations in the binary system

IV. Uses of the binary system

Comments:

It is important for students to understand that man has adapted the binary system to fill a particular need - namely, that of having a mathematical representation for the "on" and "off" positions of an electrical switch. The binary system existed and was used by mathematicians as a diversion long before modern computers were invented. Here is a prime example of a mathematical system, once thought to be useless, that has served man tremendously. Who knows what other useful adaptations my be made to some of the so called "useless" math that we now study?

Lesson 4 Integers Pages 35-43

Objective: To introduce the system of Integers

Lesson Outline:

I. Extending the number line in the negative direction

II. Absolute value and algebraic value: A comparison

III. Some examples of integers

IV. Using the number line to show addition of integers

Comments:

The subject of integers is probably the most important single concept at this grade level. Almost everything from this point on will be related to the integers in one way or another. This is one area where we should strive for near perfect performance on the part of all students, especially when dealing with the addition or combination of signed numbers. We are laying the foundation for algebra, geometry and higher mathematics and this foundation must be strong. Spend some extra time in this chapter if necessary, but drive these concepts home, as they are essential to any future progress our students may wish to make.

It is also suggested that you make the teaching of integers as visual as possible. Draw a number line and work with it. This is a device that has proved its worth in the teaching of mathematics.

Lesson 5 Subtraction of Integers Pages 44-46

Objective: To discuss the concept of "adding the opposite".

Lesson Outline

I. A brief review of adding integers

II. The concept of subtraction

  a) What do we do when we subtract?

  b) Adding the opposite

III. Using the number line to demonstrate subtraction

IV. A comparison of the rules for addition with the rules for subtraction

Lesson 6 Multiplication and Division of Integers Pages 47-52

Objective: To develop the rules for multiplying and dividing integers

Lesson Outline

I. The relationship that exists between multiplication and division

$$\left(\frac{1}{a} \times b = b \div a\right)$$

II. Use of the number line in showing how to multiply by repeated addition

III. A "proof" of the rules for multiplying and dividing.

Comments:

Before the telecast, please review the fact that anything multiplied by zero equals zero and that anything times one equals the original quantity ($a \times 0 = 0$; $a \times 1 = a$)
These facts will be used in the "proof" in section III above.

This proof will involve the use of the distributive property and the fact that $a + (-a) = 0$. Many of your students will probably not be able to follow the proof in its entirety, but they need to realize that there is a reason for the rules for multiplying and dividing integers and that these rules are not just arbitrary statements to be memorized.

Lesson 7 Combining Integer Operations
Pages 53-57

Objective: To demonstrate the order of operations when several integer operations are present in a mathematical expression

Lesson Outline

I. A brief review of the rules of addition, subtraction, multiplication and division, with examples of each

II. A demonstration of several problems with two or more operations

III. The order of performing operations when no signs of grouping are present

   a) Do the multiplications and divisions from left to right

   b) Then do the additions and subtractions from left to right

Comments:

Since we are moving rather slowly through this chapter you might find it necessary to supplement your lessons with additional practice in working with integers. Any good Algebra I text can furnish your class with some supplementary exercises and drill.

Lesson 8 Absolute Value Pages 59-62

Objective: To discuss the concept of absolute value and demonstrate the solution of some algebraic equations involving absolute value

Lesson Outline

I. The fact that finding absolute value is an operation - much like addition, subtraction, etc.

II. Some examples of finding absolute values

III. What about $|x|=a$? A thought problem

IV. The relationship between absolute value and the number line

Lesson 9 Graphing Integers Pages 63-71

Objective: A discussion of graphing points in space and the concept of a function

Lesson Outline

I. Graphing points on the number line

II. What happens when we put a horizontal number line and a vertical number line together

  a) Coordinate axes

  b) The four quadrants

  c) Positive and negative directions

  d) Locating points in space

III. The concept of a function

  a) Definition of a function

  b) The "function machine"

Comments:

A function may be expressed as 1) a set of ordered pairs of numbers 2) a word statement such as, "y is three times x." 3) and equation ($y=3x$) and 4) a graph. The function concept provides a beginning point for the study of equations, word problems, and graphs, thus, is a very critical idea. According to the definition, a function is a set of ordered pairs of numbers such that for each value of the first variable (the domain) there is one and only one value of the second variable (the range). It might be well to discuss situations where there are two or more values of the second variable. Consider $y=x$? This is a function (one value of y for each value of x). However, $y=\sqrt{x}$ is not a function. If $x=16$, y is +4 or -4 (two values). Check any Algebra I text for further information.

Lesson 10 Introduction to Geometry Pages 73-81

Objective: To discuss the concepts of point, line, plane, 2 space and 3 space

Lesson Outline

I. Introductory comments
    a) The definition of geometry
    b) Some uses of geometry

II. A brief discussion of
    a) Point
    b) Line - static and dynamic definitions
    c) Plane - Sufficient conditions for determining a plane

III. Geometry of two dimensions (examples)

IV. Geometry of three dimensions (Solid figures)

Comments:

The study of nonmetric geometry is a lot like building a house. Everything is built upon the foundation. Geometry, like the house, has to have a beginning - a starting point. This beginning is made up of a set of assumptions, definitions, etc., such as the definition of a point. After these assumptions have been made, everything else is proved by using these building blocks. Nothing can be admitted as true unless it has been (or can be) proved. We are now laying the foundation for the study of geometry, so we give certain definitions, make certain statements as beginning points and start to build our structure. Later in the course we will be proving some more difficult statements, but in each case we will refer back to the basic assumptions that we are making now.

Lesson 11 Angles and polygons Pages 81-84

Objective: To define and discuss angles and polygons

Lesson Outline

I. The definition of an angle

    a) Static definition - intersection of two lines

    b) Dynamic definition - Rotation of a line segment or ray about its initial point

II. Broken line segments

    a) Open and closed line segments

    b) Definition of a polygon

II. Types of polygons

    a) Convex - concave

    b) A look at some familiar shapes

Lesson 12 Area Pages 85-89

Objective: To review the definition of area and demonstrate some formulas for finding area

Lesson Outline

I. Review of the definition of area

II. The formula for the area of a:

   a) Rectangle

   b) Square

   c) Triangle

III. Irregular areas

Comments:

The concept of area should not be new to your students. Therefore their lesson will serve as a general review. You will probably want to enrich this lesson by providing for some additional drill in finding areas. Additional exercises may be found in Mathematics 8 by McSwain (the previously adopted text for this course) on pages 210, 211, 213, and 214.

Lesson 13 Volume Pages 90-95

Objective: To give a general review of the concept of volume and some exercises involving the volume formulas

Lesson Outline

I. A review of the concept of volume

II. Some formulas for volume

   a) Rectangular Solid (Prism)

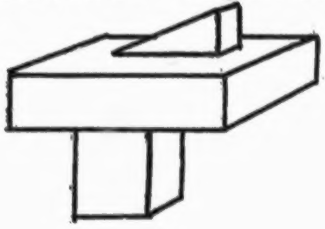
   b) Cube

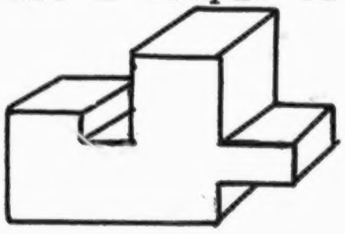
   c) Triangular Solid (triangular Prism)

   d) Irregular Solids

Comments:

As a follow up to this lesson, you might let your students actually find the volume of a few "objects" by measuring them with a ruler, finding the necessary dimensions and calculating the volume. Such "objects" should be of irregular shape, yet be composed of some of the standard geometric figures. Here are a couple of ideas:





Such objects can be made by simply nailing a few blocks of wood together. Several of these can be passed around the class for a comparitive measurement. This gives the students a chance to feel the geometric shapes and feel the concept of volume as well as actually practice measurement. Thus, we appeal to another sense, as well as the usual senses of sight and sound.

Lesson 14 An Introduction to Number Theory

Pages 97-102

Objective: To give some background concerning the study of numbers

Lesson Outline

I. A brief history of the theory of numbers

II. Odd and even numbers - the general form of odd and even numbers

III. Addition and multiplication tables for the set containing the elements O and E (odd and even).

IV. Factors and factoring

Comments:

Number theory is a very old and very interesting branch of mathematics. Here is a good opportunity to include some of the history of math and mathematicians. (See Cajori: A History of Mathematics, for more information).

Lesson 15 Prime and Composite Numbers

Pages 103-109

Objective: To demonstrate the difference between prime and composite numbers

Lesson Outline

I. Definition of prime numbers

II. Composite numbers

III. The Sieve of Eratosthenes (demonstration)

IV. A prime generator

  a) A discussion of the formula $n^2 - n + 11$

  b) When the formula fails and why

Comments:

The prime generator mentioned in section IV, above, is a very well known formula. A good research project for some exceptionally bright students might be to look up additional information on prime generators.

Lesson 16 Greatest Common Factor Pages 110-113

Objective: A discussion of how to find the G.C.F.

Lesson Outline

I. Prime factorization

II. The use of powers to express repeated factors ($12 = 3 \times 2^2$)

III. The process of finding the G.C.F.

IV. A set of rules for finding G.C.F.

Lesson 17 Least Common Multiple Pages 114-125

Objective: A discussion of how to find the L.C.M. and a comparison with the method of finding the G.C.F.

Lesson Outline

I. General definition of L.C.M.

II. The process of finding the L.C.M.

III. A comparison of the method of finding the L.C.M. with that of finding the G.C.F.

IV. Some divisibility rules

Comments:

The divisibility rules that are covered in this telelesson will enable your students to reduce almost any number of reasonable size. There are divisibility rules for other primes such as 7,11,13, etc. but these become quite complicated and cumbersome. Most any text on number theory will state these divisibility rules if you are interested in them. For additional information on G.C.F. and L.C.M., see Oré: Number Theory and its History, which is available in the math office.

Lesson 18 Introduction to Rational Numbers Pages 127-134

Objective: To review the concepts of fractions, equivalence, and reduction

Lesson Outline

I. The definition of a rational number

II. Classifications of fractions

  a) Proper

  b) Improper

  c) Mixed expressions

III. Equivalent fractions - how to prove fractions equivalent

IV. Reducing (transforming) fractions

V. The size of a fraction - greater than, less than

Comments:

This is the first lesson in a series on rational numbers. The ideas covered here represent review material for the most part and should be covered in a minimum of time.

Lesson 19 Addition and Subtraction of Fractions Pages 135-138

Objective: To furnish a brief review of the processes of adding and subtracting rational numbers

Lesson Outline:

I. Using the number line to show addition with like denominators

II. The general case for adding with like denominators:

$$\frac{a}{b} + \frac{c}{b} = \frac{a+c}{b}$$

III. Unlike denominators - the necessity of finding a common denominator

IV. The general case:

$$\frac{a}{b} + \frac{c}{d} = \frac{ad+bc}{bd}$$

V. "Borrowing" in subtraction

Comments:

Here is where we usually have to slow down for our students as their background in fractional operation is often weak. Move very slowly and deliberately through this material as it is very important.

Lesson 20 Multiplication and Division of Fractions Pages 139-148

Objective: To review the operations of multiplication and division of fractions, give general cases for each operation and justify the rule of inversion when dividing

Lesson Outline

I. A brief review of multiplication of fractions

II. The general case:

$$\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd}$$

III. A short cut (cancellation)

IV. Division of fractions

- a) The general case:

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$$

- b) Why the inversion rule is valid

Comments:

The reason for showing why we invert and multiply when dividing fractions is simply to make the students aware of the fact that these are mathematically sound reasons for the steps that we take in working problems. Do not expect your students to understand all the aspects of the demonstration, but do expect them to realize that we are not just following a set of rules. There is a reason for each operation and method in mathematics.

Lesson 21 Negative Rationals Pages 149-159

Objective: To discuss the three signs of a fraction and illustrate their use

Lesson Outline

I. A discussion of the fact that any fraction has a sign of the numerator, a sign of the denominator, and a general sign of the fraction itself

II. Changing any two of the signs leaves the fraction unchanged

III. Solution of problems involving the concepts above

Comments:

Please have your students bring a straight edge and compass in time for the next telecast. These tools will be necessary for participation in lesson number 22.

Lesson 22 Congruency Pages 161-165

Objective: To discuss the concept of congruency, its symbol and basic constructions involving congruence

Lesson Outline

I. The meaning of congruence using the idea of superimposition

II. The symbol for "is congruent to".

III. Two basic constructions using straightedge and compass

   a) Copying an angle

   b) Copying a line

Comments:

Students will need their ruler and compass for next week's telelesson also.

Lesson 23 Congruent Triangles Pages 166-171

Objectives: To show the sufficient conditions for congruent triangles

Lesson Outline

I. Copying a triangle

   a) Using two sides and the included angle (SAS)

   b) Using two angles and the included side (ASA)

   c) Using three sides (SSS)

II. The fact that corresponding sides of congruent triangles are equal

Comments:

As a prelude to the next telecast, why not ask your class for some suggestions for proving congruency in right triangles (hypotenuse and an acute angle). These special cases for special triangles may give your students some insight into geometric analysis.

Lesson 24 Angular Measure Pages 179-189

Objective: To discuss degrees, minutes and seconds in measuring angles

Lesson Outline

I. Using a protractor to measure angles

II. Complementary angles

III. Supplementary angles

IV. A few exercises in finding complements and supplements

Comments:

The practice problems on complementary and supplementary angles can be made as difficult or as easy as you like by using complicated measures or simple ones. This is a good place to review fractions by giving problems such as, "Find the supplement of an angle of $108\ 2/5^{\circ}$". Decimals can be reviewed by using the same problem, only making the angle 108.4°. Denominate numbers can be covered by saying, "108 degrees and 24 minutes". Thus, the same problem can be used for several levels of difficulty.

Lesson 25 Decimals Pages 193-200

Objective: To review decimal notation and discuss addition and subtraction of decimals

Lesson Outline

I. Decimals as fractions

  a) Fractions involving powers of ten

  b) Names of the various decimal places

II. Addition and subtraction of decimals

  a) Lining up the decimal point and why we do it

  b) "Borrowing" in subtraction

Comments:

Most of our students have little difficulty here, so you may be able to cover these pages quickly. If so, a discussion of the metric system (pages 199-200) can be of value and should provide a good "filler" if you need one!

Lesson 26 Multiplication and Division of Decimals Pages 201-205

Objective: To review the processes of multiplying and dividing decimals and give reasons why we divide decimals like we do

Lesson Outline

I. Multiplying fractions whose denominators are powers of ten as a justification for placing the decimals point in a multiplication problem

II. Division of decimals, using denominate numbers:

a) $5\ \begin{array}{l} \text{3 feet 2 inches} \\ \hline \big)\text{15 feet 10 inches} \end{array}$

b) $5\ \begin{array}{l} \text{3 ones 7 hundredths} \\ \hline \big)\text{15 ones 35 hundredths} \end{array}$

c) $5\ \begin{array}{l} 3.07 \\ \hline \big)15.35 \end{array}$

III. Division problems where the divisor contains a decimal

Comments:

Usually, division of decimals causes some rough going, so we are moving slowly here. Give your students lots of practice on these. (see McSwain, et al: Mathematics 8, pages 140-141, page 343. Also see: School Mathematics I, the seventh grade edition of the text for this course pages 319-321).

Lesson 27 Rounding Decimals Pages 206-209

Objective: To review the processes of dividing decimals and to discuss estimating and rounding when a division problem does not come out evenly

Lesson Outline:

I. A review of the three cases of dividing decimals:

$$\text{Whole number}\,\overline{)\text{decimal}} \qquad \text{decimal}\,\overline{)\text{decimal}}$$

$$\text{decimal}\,\overline{)\begin{array}{l}\text{whole}\\\text{number}\end{array}}$$

II. Rounding decimals

III. Estimating the size of a problem without actually doing the calculations

Comments:

A certain amount of basic skill in estimating answers to multiplication and division problems is necessary if a student is going to be able to do arithmetic with any degree of proficiency. This is especially true when working with decimals, as a misplaced decimal point can change the entire result of working a problem. Being able to estimate will enable the student to know whether his answer is REASONABLE or not and may cause him to recheck his work if the answer is out of line with his mental approximation.

Probably the best approach to the topic of estimation is that of oral drill on simple problems where the student can "round off" in his head. This can be a lot of fun for the students and at the same time can review the multiplication and division facts.

4

Lesson 28 Laws of Exponents Pages 210-212

Objective: To show the derivation of some of the laws of exponents

Lesson Outline

I. Definition of a power

   a) $A^3 = A \cdot A \cdot A$

   b) Recognition of base, power and exponent

II. Laws of exponents for multiplication

III. Laws of exponents for division

Comments:

This lesson sets the stage for the study of scientific notation in the next lesson. You might want to expand on the laws given here and give quite a bit of drill. Here again, any Algebra I text can give you some ideas.

Lesson 29 Scientific Notation Pages 213-220

Objective: To discuss exponential notation and powers of ten as a useful tool in working with large and small numbers

Lesson Outline

I. Writing numbers such as 100; 1,000; 10,000; etc. as powers of ten

II. Writing decimal values as powers of ten

$(.1 = \frac{1}{10^1}\ ;\ .01 = \frac{1}{10^2}\ ;\ .001 = \frac{1}{10^3}$, etc.)

III. The general concept of scientific notation

- a) Changing from regular notation to scientific notation
- b) Changing back to regular notation from scientific notation

IV. Multiplying, using scientific notation

V. The law of exponents for multiplication

Comments:

Here is another area where one can practice on the multiplication and division tables. The telecast will cover only multiplying by using powers of ten. However, it is expected that the classroom teacher will follow up with a discussion of division, as well as give some practice on working with this useful concept.

Lesson 30 Repeating Decimals Pages 223-230

Objective: To show how to change a repeating decimal into a fraction and vice-versa

Lesson Outline:

I. The nature of non-terminating decimals

   a) non - repeating

   b) repeating

II. The process of changing from a repeating decimal to a fraction

III. Why we cannot change non-repeating decimals into fractions

Comments:

Do not expect your students to comprehend the idea of irrational numbers fully at this point. They'll get plenty of information about irrationals later in Algebra I.

Lesson 31 Ratio and Proportion Pages 231-240

Objective: To define and discuss the concepts of ratio and proportions and to show the usefulness of these concepts

Lesson Outline

I. Definition of a ratio

   a) A comparison of like quantities

   b) Ways of expressing a ratio

II. Proportions

   a) Definition

   b) Ways of expressing proportions

   c) Means and extremes

III. Solving simple proportion problems by using the rule that, "The product of the means equals the product of the extremes"

Comments:

Be sure that your students are able to solve simple proportions by cross multiplication. However, emphasize the fact that cross multiplication can be done "legally" only when there is a proportion (two fractions that equal each other).

Lesson 32 Scale Drawings Pages 241-246

Objective: To demonstrate the practical application of proportions to scale drawings

Lesson Outline

I. A look at a blue print

II. Some problems taken from the blue print, using the scale that is given

III. Map reading

Comments:

This lesson is given for the purpose of demonstrating the practicality of mathematics. Of all the areas we will study this year, this topic and the topic of percent are probably the most important from a practical standpoint. Make the most of this opportunity to show some real meaning to the subject you teach. Wherever possible, show the students that this mathematics business is important and practical stuff! Maybe after a few months, they'll begin to believe you and stop asking the constant question, "What are we going to use this for?" It's worth a try!

Lesson 33 Physics Pages 247-248

Objective: To demonstrate the use of ratio and proportion in the solution of physics problems

Lesson Outline

I. Demonstration of Hooke's Law using spring and weights (see text - p 247).

II. Derivation of a set of data from which a formula can be derived

III. Deriving formulas from experimental data-how a scientist goes about making predictions from known data

Comments:

This experiment and the accompanying mathematical exercises should serve as an example of how a knowledge of mathematics can be helpful in science. This might be a good place to discuss a statement made by a mathematician many years ago; that mathematics is both the queen and servant of science. Your students may react with surprise to this statement. However, it is important for them to realize that while mathematics is a science in itself and represents probably the purest form of science (almost to the point of being an art!) it also is a tool to be used by the scientist, business man and even the housewife.

Lesson 34 Introduction to Percent Pages 249-252

Objective: To define and discuss percent using proportions as the basis for discussion

Lesson Outline

I. The definition of percent

II. Changing fractions to decimals to percent

III. Getting a percent of a number

  a) Problems of the type "Find 6% of 500", etc.

  b) Why we can use the formula $P = B R$

Comments:

This is the first of two lessons on percent and percentage. The lesson that follows will go into the details of finding the rate and base.

Lesson 35 More on Percent Pages 253-259

Objective: To discuss the use of the formula P = BR when solving for any letter

Lesson Outline

I. Variations on the formula for percentage

II. Solving for the base when the rate and percentage are given

III. Solving for the rate when the base and percentage are given

IV. Identifying the base, rate and percentage

Comments:

Perhaps our approach to this topic is somewhat traditional and direct. However, the identification of the various parts of a percentage problem is, at best, difficult for our students and statements such as, "the base follows the word 'of' in the sentence", while not completely correct 100% of the time will give the students a general guideline for identifying the base. The rate, of course, if expressed as a percent, will always have the % sign. What's left will be the percentage.

Lesson 36 The parallel Postulate
Pages 261-268

Objective: To discuss Euclid's parallel postulate and introduce non-Euclidean geometry

Lesson Outline

I. The parallel postulate of Euclid
    a) What this postulate implies
    b) Facts of geometry that are derived from the parallel postulate

II. Mathematicians who questioned the parallel postulate
    a) Lobachevski and Bolyai
    b) Riemann

III. Some results of the discoveries of non-Euclidean geometers

Comments:

This lesson is mostly a historical discussion of Euclid's parallel postulate and some of the discoveries of other famous mathematicians. While this may seem to be an insignificant bit of information at this point in the curriculum, it lays the foundation for a study of non-Euclidean geometry in later years. We assume that plane (Euclidean) geometry describes the universe in which we live, since we live on Earth and the planet on which we live appears relatively flat when viewed from a position on it. However, some questions about space cannot be explained in terms of a flat geometry. Thus, we may find that we actually exist in a non-Euclidean universe when our habitat is viewed on a larger scale.

Lesson 37 Polyhedra Pages 269-270

Objective: To demonstrate and discuss the five regular convex polyhedra

Lesson Outline

I. A demonstration of some of the characteristics of solid figures

II. A demonstration of the five regular solids

Comments:

This section of our texts provide an excellent opportunity for each student to construct the regular polyhedra themselves. By using construction paper (or regular notebook paper if construction paper is not available) they can sketch, cut, and fold a pattern that will make a physical object which represents a geometric solid. The pattern for these cut-outs can be found in the second workbook for Mathematics, Structure and Skills; by Denholm and Blank (Science Research Associates, 1968). Although the patterns in this workbook are small, the student will have an opportunity to see what actually goes together to make up the aforementioned geometric shapes. You may recognize the above title as that our low level series in mathematics for grade 8.

Lesson 38 Proportions and Parallel Lines
Pages 271-278

Objective: To demonstrate the proportional relationships that exist among transversals that cross parallel lines

Lesson Outline

I. A proof of the theorem that if parallel lines cut off congruent segments on one transversal, then they cut off congruent segments on all transversals.

II. An extension of the theorem to include proportional segments between parallels

Lesson 39 Similar Triangles Pages 278-282

Objective: To discuss proportionality in similar triangles

Lesson Outline

I. Necessary and sufficient conditions for similarity in geometric figures

   a) All corresponding angles congruent

   b) All corresponding sides proportional

II. The case of the triangle

   a) Similarity guaranteed by two pairs of congruent angles only

   b) Solving for missing sides of similar triangles

III. An illustration of indirect measurement using similar triangles

Comments:

This lesson sets the stage for an introduction to the Pythagorean Theorem in the next lesson. It also provides some background for the study of indirect measurement (trigonometry) and similar topics in higher mathematics.

Lesson 40 The Pythagorean Theorem
Pages 283-285

Objective: To demonstrate the rule of Pythagoras and its applications

Lesson Outline

I. The nomenclative of a right triangle

II. A demonstration of the validety of the rule of Pythagoras

III. Squaring and taking square roots

Comments:

This lesson is extremely important. It not only has practical applications to indirect measurement, but sets the stage for the study of trig. Give your students a lot of practice in finding the various sides of a right triangle when the other two sides are given.

Next time we will discuss two special cases for right triangles: the case of the 30-60-90-degree triangle and the case of the 45-45-90 degree triangle.

Lesson 41 Two Special Cases of the Pythagorean Theorem Pages 286-296

Objective: To demonstrate the case of the isosceles right triangle and the 30-60 right triangle

Lesson Outline

I. A discussion of the isosceles right triangle

  a) The diagonal of a unit square as the hypotenuse of a right triangle

  b) The relationship of the sides

II. Solving for the missing sides of an isosceles right triangle

II. A discussion of the 30-60 right triangle

  a) Extending one side of an equilateral triangle

  b) The relationship of the sides

IV. Solving for the missing sides of a 30-60-90 triangle

V. Trigonometric ratios

Comments:

A knowledge of the special right triangles will enable your students to see through a lot of difficulties that will arise later in high school mathematics.

Do not hesitate to discuss the trigonometric ratios with your class. However, do not strive for mastery, as this will come later. Much later!

Lesson 42 Irrational Numbers Pages 299-306

Objective: To introduce the concept of numbers that are not rational

Lesson Outline:

I. Perfect squares

   a) The square root of a perfect square

   b) The square root of a number that is NOT a perfect square

II. Decimal approximations to $\sqrt{2}$, $\sqrt{3}$, and $\sqrt{5}$

Comments:

Euclid's proof of the irrationality of $\sqrt{2}$ is presented in the text, a little at a time, in the course of several pages (pages 299-301). The proof in summary is as follows:

1) Assume $\frac{a}{b}$ to be the fractional value of $\sqrt{2}$, where a and b are $\neq$ zero ad are relatively prime (the fraction is at lowest terms).

2) $\frac{a}{b} = \sqrt{2}$, then $a = \sqrt{2}b$ (multiplying both sides of the equation by b)

3) Squaring both sides of the equation yields: $a^2 = 2b^2$

4) Obviously, the right hand side of the equation represents an even number (in the form of 2b2). Since we have an equality, the value of a^2 must also be even. Likewise, a will be even. If a is even, it has the form of 2k, where k represents some constant

5) Substituting into equation (3) above, we have:

   $(2k)^2 = 2b^2$ or $4k^2 = 2b^2$

6) Dividing by 2, yields

$2k^2 = b^2$

7) By the same argument as (4), above, we would conclude that b^2 and therefore b, will also be even. This is impossible, however, since our premise was that a and b are relatively prime. Thus is irrational and CANNOT be expressed as a fraction. While this proof is a little deep, it provides a summary of what's happening on pages 300-301.

Lesson 43 The Square Root Algorithm
Pages 307-309

Objective:

I. The square root algorithm

   a) Move decimal point up

   b) Divide into groups of two on left and right of decimal point

      1) A group of one digit on left-hand side is OK

      2) A group of one digit on right-hand side must have a zero added

   c) Find the largest perfect square that will go into the first group

II. The process of extracting and evaluation the square root

Comments:

The technique used in this telelesson is essentially the same one used in the text pages 307-309.

Lesson 44 Square Root by the Average Method Pages 310-312

Objective: To present a demonstration of how to find square roots by the method of averages

Lesson Outline

I. Finding averages

II. Finding square root by the method of averages

Comments:

Since the text covers the method of finding the square root of a number by the algorithm, the emphasis is this lesson will be on another method that is useful for finding roots where extreme accuracy is not required. Briefly, the method is as follows:

1) To find $\sqrt{18}$ for instance, guess at the value, say 4.

2) Divide the guess (4) into the number you want to find the square root of (18). This gives 4.5.

3) Now, get the average of the guess and the answer you got from the division:

$$\frac{4+4.5}{2} = 4.25$$

4) 4.25 is the approximate value of $\sqrt{18}$. For greater accuracy, repeat the process, using 4.25 as your guess.

This is a handy technique to know. The beauty of the method of averages is that it is self-correcting. No matter what you guess, the process corrects itself to a close value of the desired root.

Lesson 45 Decimal Approximations for Square Roots Page 313-322

Objective: To discuss the transformation of simple square roots

Lesson Outline

I. Multiplying radical expressions together:

$$\sqrt{a} \cdot \sqrt{b} = \sqrt{ab}$$

II. Transforming a radical

$$\sqrt{12} = \sqrt{4.3} = \sqrt{4} \quad \sqrt{3} = 2\sqrt{3}$$

III. Using decimal approximations to evaluate radicals

Comments:

While the text doesn't emphasize the above process, it is a useful method for finding square roots.

Omit the first part of the next chapter - pages 325-349. This section on probability may be used as filler at the end of the year if desired.

Lesson 46 Statistics Pages 350-357

Objective: To discuss graphical representation of statistical data

Lesson Outline

I. Various types of graphs

   a) Bar chart

   b) "Pie" charts

   c) line graphs

II. Choosing a scale

III. An example of making a bar graph

Lesson 47 Measures of Central Tendency
Pages 359-363

Objective: To discuss mean, median and mode

Lesson Outline

I. The three measures of central tendency

  a) Mean (average)

  b) Median (middle item)

  c) Mode (most frequent item)

Comments:

Your students will need to bring compasses to class for the next telecast. Have each student purchase one.

Lesson 48 Circles and Spheres Pages 367-370

Objective: To discuss the nature of circles and spheres

Lesson Outline

I. Circles intercepted by lines

   a) Radius

   b) Diameter

   c) Chord

   d) Tangent

   e) Secant

II. Spheres - characteristics

   a) Great circle

   b) Small circles

Comments:

In this lesson we will discuss concepts only. No calculations will be included.

Lesson 49 Arcs and Angles Pages 371-377

Objective: To discuss central angles and inscribed angles in circles

Lesson Outline

I. Degree measure - The basic postulate that a central angle is equal in degrees to its intercepted arc

II. Proof that an inscribed angle is equal to one half its intercepted arc

III. Some computations involving arcs and angles

Lesson 50 The Mysterious Number :
Pages 378-382

Objective: A discussion of the circumference of a circle

Lesson Outline

I. Approximations to the circumference of a circle

II. The real meaning of π

III. Approximate values for π

Comments:

The number π is a constant that equals the circumference of any circle divided by its diameter. It is an irrational number (not exactly equal to a fraction) and has no exact value, numerically speaking. In 1882 a mathematician named Lindemann proved that π is a transcendental number (not real, nor complex). For a really deep project some of your students may want to work up a report on transcendental numbers.

Lesson 51 The Area of a Circle Pages 383-385

Objective: To demonstrate how we get the formula $A = \pi r^2$

Lesson Outline

I. The concept of a limit

II. A derivation of the formula for the area of a circle

III. Square units

Comments:

The illustration in the telelesson is simply a variation on the one in the text. A couple of new words may be introduced, but the idea is the same.

Lesson 52 Cylinders Pages 385-390

Objective: To demonstrate how to find the volume and lateral area of a cylinder

Lesson Outline:

I. Bringing a circle through another dimension

II. Finding the lateral area and total area of a cylinder

Lesson 53 Pre-Algebra Mathematics Pages 397-400

Objective: To review the concepts of Algebra

Lesson Outline

I. Solution of simple equations

  a) Clear fractions

  b) Remove parentheses

  c) Letters on one side, numbers without letters on the other

  d) Collect like terms

  e) Divide by the coefficient of the unknown

II. The "undo" process

Comments:

Additional practice problems may be found in any Algebra I text. Give your students a lot of drill here!

Lesson 54 Properties Pages 401-404

Objective: To review the fundamental properties of real numbers

Lesson Outline

I. The distributive property

II. Properties of zero and one (identities)

III. Inverses

   a) Negatives

   b) Reciprocals

Lesson 55 Solution of Word Problems
By Using Algebra Pages 405-410

Objective: To dramatize and demonstrate the use of equations in solving word problems

Lesson Outline

I. Solution of some selected problems from the text - pages 406-408

Comments:

In this lesson we will dramatize a few simple word problems to emphasize proper reading and interpretations. Our students need a lot of individual help here as they are quite weak in reading ability and in logical interpretation of what they read.

Lesson 56 Review of Absolute Value

Pages 411-413

Objective: To demonstrate now to solve equations involving the absolute value sign

Lesson Outline

I. The fact that the absolute value sign gives directions for an operation

II. Solution of equations involving absolute value

Comments:

The heart of this lesson involves the fact that if $|x| > a$, then we have a union of two sets $x > a$ or $x < -a$ while the statement $|x| < a$ means the intersection of $x < a$ and $x > -a$. This is an excellent place to re-emphasize the concepts of union and intersection of sets.

Lesson 57 Graphing equations Pages 419-422

Objective: To demonstrate how to graph a linear equation in two unknowns

Lesson Outline

I. The coordinate system
  a) Axes
  b) Quadrants

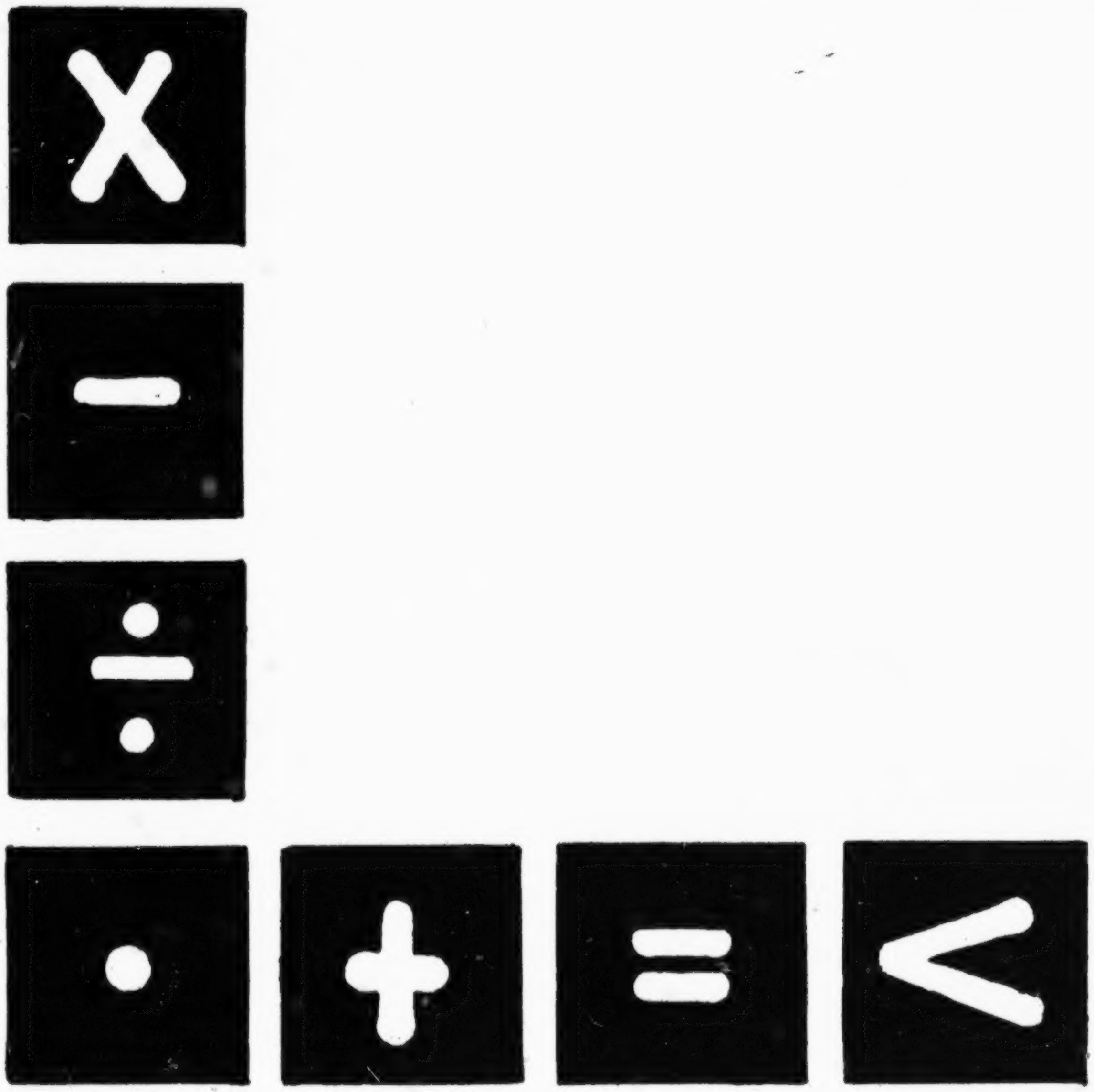
II. Choosing values for substitution
  a) Domain
  b) Range

III. Graphing the line
  a) Slope
  b) Intercepts

ED030556

BESE-Title III

RELATED MATH I



EDGEWOOD ISD INSTRUCTIONAL TELEVISION KHS 77

Teacher's Guide - 9

SE005910

RELATED MATH I
TEACHER'S GUIDE

EDGEWOOD INDEPENDENT SCHOOL DISTRICT
INSTRUCTIONAL TELEVISION
KHS77 - TV

MR. EARLE BOLTON, MATH COORDINATOR

YOUR COORDINATOR'S MESSAGE

The lesson outlines that follow are designed to give you an idea of what to expect when a telecast is scheduled for your class. The telelessons are given for the purpose of providing enrichment and coherence for the entire math program and are not, in any way a substitute for what you, the teacher, will do in the classroom.

You are the key to successful learning and the telelessons are only a part of the overall learning situation.

In order to be better prepared for what is going to be discussed on TV please read each outline carefully before air time and where special preparations are required, take care of these necessities before the lesson begins. Your cooperation on this point is especially important, as the instructor will assume that these preparations have been made before he begins.

In some cases it may not be possible to cover all the material listed in the outline. In such cases you should, after the telecast, cover all topics that were ommitted because subsequent lessons may be based on some of this information.

Be sure to keep up to date and pace your class so that you will be discussing the topic that is to be covered on TV at the time it is scheduled. Deviation of a day or so either way will not matter but for maximum success we should all try to be together.

If you have suggestions or criticism, both adverse and complementary, please let us know. Only with your help can we make team-teaching through television a success.

Best of luck for a successful course!

Earle H Bolton

Earle H. Bolton
Mathematics Coordinator

RESPONSIBILITIES OF THE CLASSROOM TEACHER

BEFORE THE TELECAST:

Turn the receiver on five minutes before the scheduled time. Using the Teacher's Guide, the classroom teacher should give the students a general idea of what will be covered on the telecast.

Arouse the students' interest.

Introduce the subject matter.

Prepare the students for the lesson.

The teacher should set up a receptive atmosphere and adjust the TV receiver for a clear picture and good sound.

DURING THE TELECAST:

The classroom teacher should be in position to watch both the receiver and the students.

Supervise your class closely.

Observe students reactions.

Take notes for personal use.

AFTER THE TELECAST:

The sessions after the telecast should be used to promote enthusiasm and to furnish students an opportunity to perform individually. It is essential that some follow-up be provided.

Lead discussions.

Answer questions.

Explain vocabulary.

Lead into related activities (some of which are listed in the Teacher's Guide).

ABOUT THE COURSE

RELATED MATH I is the first in a series of two courses designed to fit the needs of the average student who is not prepared for Algebra I in the 9th grade. The two course sequence of Related Math I and II contain essentially the same material as Algebra I, only spread over a two year period. The emphasis is on Algebraic concepts. However, some geometry is included in the second course. Completion of Related Math I and II will satisfy graduation requirements in the Edgewood Independent School District, but better students are urged to take geometry and Algebra II after completing both Related Math courses.

Page numbers, which appear in the upper right hand corner of each lesson outline represent the approximate place in the text where each class should be during the week indicated. The pace, as dictated by the TV schedule, was determined after several semesters of trial and represents the pace that has been followed by several successful teachers.

ABOUT THE TEXT

The text outline for this TV series is Modern Basic Mathematics, Book I by Skeen and Whitmore (Singer, 1964). All page numbers and chapter headings refer to this text.

ABOUT THE TEACHER

Earle H. Bolton is coordinator of Mathematics for the Edgewood Independent School District of San Antonio, Texas. He was a classroom teacher at the Edgewood High School for seven years. He has taught mathematics for both high ability and low level students. Mr. Bolton received his B.S. Degree from the Georgia Institute of Technology in 1954 and his M.S. in mathematics from Trinity University in 1965.

TELEVISION OUTLINE

Channel 13 | Time: 9:05, 10:20, 2:05

Lesson Number	Date 1968-1969	Topic
1.	9/5 -1/23	Introduction, Number Systems
2.	9/12-1/30	Sets and Properties
3.	9/19-2/6	Addition and Subtraction
4.	9/26-2/13	Multiplication and Division of Integers
5.	10/3-2/20	Conditional Equations
6.	10/10-2/27	Fractions, Ratio and Proportion
7.	10/17-3/6	Decimals- Direct variation
8.	10/24-3/13	Interest by the 6% method
9.	10/31-3/20	Solving Equations
10.	11/7-3/27	Word Problems
11.	11/14-4/10	Introduction to Graphs
12.	11/21-4/17	Graphing Linear Equations
13.	12/5-4/24	Simultaneous Equations
14.	12/12-5/1	Distance, Rate and Time Problems(Uniform Motion)
15.	12/19-5/8	Laws of Exponents
16.	1/9-5/15	Operations with Polynomials

OUTLINE SUBJECT TO REVISION

ALL TELECASTS ON THURSDAYS

Lesson I		Introduction to Number Systems
Pages 1-30

Objectives: In this lesson we will introduce some of the various number systems that we will encounter during the course of the year. Special characteristics of each set of numbers will be discussed. At the beginning of the lesson several hints on viewing TV will be mentioned.

Lesson Outline

- I. Introduction
  - A. General comments about the course
  - B. What is expected of the students
    - 1) Prepare before the lesson
    - 2) Cooperate with both teachers
    - 3) Follow presentation carefully
    - 4) Take notes carefully and quickly
- II. Number systems - the number line
  - A. Natural numbers
  - B. Whole numbers
  - C. Integers
  - D. Rational numbers
- III. Symbols used in mathematics
  - A. Symbols used in mathematics
  - B. Symbols of operation

Comments:

Omit the Egyptian number system and the triangle system. (pp 6 - 13) Emphasize the principles and properties of natural and whole numbers. Cover numbers to other bases than base ten, but do not emphasize this as it should be review material for most students.

Lesson II Sets and Properties Pages 31-66

Objective: In this lesson we will discuss the concept of a set as well as some of the operations that can be performed with sets. The fundamental properties, using the system of whole numbers as a model, will be discussed at length.

Lesson Outline

I. Sets
  A. Definition
  B. One-to-one correspondence
  C. Disjoint sets
II. Operations with sets
  A. Union
  B. Intersection
III. The fundamental properties
  A. Closure
  B. Commutative property
  C. Associative property
  D. Distributive property
  E. Identity
  F. Inverse

Comments:

Most your students will have a fair background in the materials covered in this lesson as a result of their experiences in junior school. There are several activities that can be used to add depth to the lesson, such as discussing whether some of the properties listed above will hold for number systems other than the set of whole numbers.

A discussion of modular arithmetic may be enriching for capable classes. Here a complete, finite set can be built and analyzed for comutativity, associativity, etc. While a number system, say (mod 5), will take some time to analyze, it is well with the effort. Understanding gained by "playing" with such systems can be valuable. The (Mod 5) system is the set of remainders you get when dividing a number by 5. Below is the addition table (mod 5).

	0	1	2	3	4
0	0	1	2	3	4
1	1	2	3	4	0
2	2	3	4	0	1
3	3	4	0	1	2
4	4	0	1	2	3

Notice the patterns. A test to see whether the comutative property holds would involve taking several pairs of numbers and comparing results.

Lesson III   Addition and Subtraction
Pages 67-91

Objective: To give a complete derivation of the rules for adding and subtracting integers

Lesson Outline

I. General comments about the nature of signed numbers

II. Addition of integers using the number line as a model

III. The rules for adding integers two at a time

IV. A discussion of adding more than two signed numbers

V. Subtraction of integers

    A. Subtraction defined as "adding the opposite"

Comments:

This is the first of two lessons on integers. Next week's lesson will deal with multiplication and division and will entail skipping back to pages 241-263 of the text. It is suggested that you cover these pages briefly the day of the telecast to simply tie multiplication and division to the operation of adding and subtracting. Do not try for mastery at this time as we will cover this material again later in the course.

Lesson IV Multiplication and Division of Integers Pages 241-263

Objective: To discuss and derive the rules for multiplying and dividing integers.

Lesson Outline

I. A short review of the processes of adding and subtracting integers

II. Multiplication of Integers

    A. Using the number line

    B. Multiplication defined as repeated addition

    C. The rules for multiplying two integers at a time

    D. Multiplying more than two integers at a time

III. Division of Integers

IV. Combinations of multiplication and division in the same problem.

Comments:

Next week's telecast will bring us back to chapter three and pick up the course where we left it. It is felt that multiplication and division should be taught along with addition and subtraction for better continuity, thus the skipping around in the text.

Lesson V Equations Pages 92-110

Objective: To demonstrate the fundamental properties of equations and their applications

Lesson Outline

I. Conditional equations
    A. Mathematical sentences
        1. True
        2. False
        3. Open
    B. Keeping the balance in an equation

II. Fractions
    A. Why we cannot divide by zero
    B. Why we invert and multiply when dividing one fraction by another

Comments:

Our long range objective at this point should be that each student be able to solve any reasonable linear equation by the end of the course. We are laying the foundation for this objective at this point.

Lesson VI Fractions, Ratio and Proportion

Pages 111-182

Objective: This lesson contains a review of the operations with fractions and an introduction to ratio and proportion.

Lesson Outline

I. Definition of addition with like denominators

II. Definition of addition with unlike denominators

III. Prime and composite numbers

IV. Ratio and proportion

    A. Definition of Ratio

    B. Checking a pair of equivalent fractions by product of means and extremes

Comments:

The section on ratio and proportion provides a good place to digress a little into some of the many applications of proportions, variation, etc. Most of the practical problems in which the average person uses mathematics can be mastered by a good knowledge of how to solve proportions. A discussion of direct and inverse proportions may be of use to the better students at this point.

Lesson VII Decimals and Direct Variation

Pages 183-240

Objective: To justify some of the rules that are used when computing with decimals.

Lesson Outline

I. Changing from fraction to decimal to percent to show the relationship between fractions and decimals

II. Multiplication of decimals

  A. The rule for multiplying decimals

  B. Why the rule words

III. Division of decimals

  A. Division of a decimal by a natural number

  B. The three cases of division when decimals are involved

IV. Direct variation

  A. Definition

  B. Constant of variation

Comments:

In this chapter, emphasize the operations with decimals and the use of per cent and interest. Direct variation, while introduced on TV, can be touched lightly in class as it is covered later in the text.

Lesson VIII Repeating Decimals Interest by the 6% Method Pages 241-263

Objective: To discuss how to change a repeating decimal to a fraction. To discuss a short cut for finding interest when the rate is 6% per annum.

Lesson Outline

I. Changing a repeating decimal to a fraction

   A. Definitions - terminating, non-terminating, repeating, and non-repeating

   B. Irrational numbers

   C. The process of changing a repeating decimal to a fraction

II. Interest by the 6% method

   A. The formula i = p r t

   B. Reductions in the formula

Comments:

Brighter students can become quite proficient with the 6% method of finding interest. They should be encouraged to figure interest at various other rates as well as for time periods other than 60 days. The main thing, however, is that all students be able to compute interest by the formula i = p r t.

Lesson IX Solving Linear Equations Pages 264-284

Objective: To intensify the study of equations and give some hints that will enable students to solve almost any equation of first degree.

Lesson Outline

I. Solving linear equations by "undoing" what the equation says

II. The order of "undoing" an equation

   A. Clear of fractions

   B. Clear of parentheses

   C. Letters to one side - numbers without letters to other

   D. Combine like terms

   E. Divide by the coefficient of the unknown

III. The solution of a few equations

   A. With numbers

   B. With letters only

Comments:

While the method listed in section II above is certainly not the ONLY way to solve a linear equation, a student will avoid a lot of trouble if he follows the steps in the order listed. When solving equations containing letters only, the student is usually better off if he used the "undo" method.

Lesson X   Word Problems   Pages 285-306

Objective: To show students the necessity of careful interpretation when working a word problem.

Lesson Outline

I. Reading a word problem

   A. Quickly

   B. Carefully

   C. Try to set up an equation

II. Solution of some typical word problems

   A. Consecutive integer problems

   B. Age problems

III. Conclusions - Mention need for graph paper next week

Comments:

Omit pages 307-319. Emphasize the general concepts of working word problems and also emphasize reading. Most of our students are afraid of "story problems". We would do well to show then that these are life problems and are where mathematics really becomes meaningful.

Students will need to buy a package of graph paper with every 5th line darker than the rest and with numbered edges in order to be prepared for next week's lesson.

Lesson XI Introduction to Graphing Pages 333-357

Objective: To give practical experience in locating points on the coordinate grid.

Lesson Outline

I. Introductory comments on graphical representation

II. The coordinate axes and their relation to space

   A. The four quadrants

   B. The origin

   C. Locating points in the coordinate plane-ORDERED PAIRS

   D. An exercise on locating points-class participation

III. Ways of expressing coordinates

   A. An ordered pair

   B. Tabular form

   C. In the form of an equation

IV. A problem on locating points in the coordinate plane

Comments:

The material on the first few pages of Chapter 7 need not be emphasized unless you feel that it will be beneficial. The main thing is that students be able to take a linear equation and graph it as on page 345.

Part of this lesson is designed for student participation. Please see that each student has graph paper and is following the lesson closely enough to do what will be asked of him.

In the participation part (Sect. II D, above) we will give some points to plot. Then the student will be asked to CONNECT them and find out something about the Geometric figure formed. This type of exercise can easily be continued after the telecast.

Lesson XII Graphing Equations Pages 358- 362

Objective: To demonstrate how to solve a pair of linear equations by graphing. To interpret the meaning of the intersection of a pair of graphs.

Lesson Outline

I. Graphing a linear equation

  A. Solve for Y

  B. Make a table

  C. Plot the coordinates

  D. Draw the line

II. Graphing a pair of linear equations

  A. The intersection of the pair

  B. The meaning of the "solution"

III. Short cuts and hints in graphing

IV. Inconsistent equations and how to recognize them.

Comments:

You may notice that in the telelessons, students are urged to always solve for Y. This is so they'll develop the habit and will be able to determine slope and intercept easily when they get to Related Math II. Of course the equations can be graphed by solving for either, but we want to begin to develop these habits early.

Lesson XIII Algebraic Solutions of Simultaneous Equations Pages 363-370

Objectives: To show why graphing is an inaccurate way of solving a pair of equations simultaneously and to offer several techniques for solving algebraically.

Lesson Outline

I. The disadvantages of a graphical solution

II. Solving a pair of linear equations by algebraic methods

  A. Addition - subtraction method

  B. Multiplication and division as applied to the addition - subtraction method

  C. The substitution method

  D. The comparison method

Comments:

This is a most important section. It may be necessary to spend some extra time on the basic concepts of graphing as there is a lot of mathematics here! However, don't be too disheartened if most students fail to comprehend several of the methods of solution that are covered in this section. Just make sure they can solve by at least one method. Most will probably prefer the addition- subtraction method.

Lesson XIV Uniform Motion Problems Pages 370-388

Objective: A general discussion of the formula, $d = r t$, wth applications to word problems.

Lesson Outline

I. The solution of several problems from page 375 involving distance, rate and time

  A. Setting up the problem

  B. The use of a chart

  C. The solution

  D. Checking the solution

Comments:

Since these problems usually cause quite a bit of difficulty, we feel that they merit a special TV lesson. Although these problems are important enough to warrant some time being spent on them, do not allow them to bog your schedule down, as some students will never get them.

We will omit chapters 8 and 9 and skip to chapter 10 immediately following chapter 7. If time permits, materials in chapters 8 and 9 may be covered, but not at the expense of Chapter 10 as we are trying to cover algebraic content for the most part. The Geometric concepts will be discussed at length in Related Math II.

Lesson XV Laws of Exponents Pages 509-529

Objectives: To furnish a deviation of some of the laws of exponents and explain why these laws work.

Lesson Outline

I. Laws of exponents as applied to:

A. Multiplication

B. Division

II. Why anything to the zero power is equal to one (except zero to the zero power)

II. The meaning of a negative exponent

IV. Expressions like:

$\left(\frac{a}{b}\right)^n$, $(a\ b)^n$, and ab^n

and their differences

V. Multiplying expressions containing negative exponents

VI. Scientific notation

Comments:

When students get bogged down with exponential problems, always have them refer back to the FUNDAMENTAL definition of what an exponent means. This can usually unscramble any difficulty for them.

Lesson XVI Polynomials Pages 530-549

Objective: To define and discuss the various forms of polynomials. To discuss the fundamental operations with polynomials

Lesson Outline

I. Definitions
    A. Monomials
    B. Binomials
    C. Trinomials
    D. Polynomials

II. Addition of monomials and polynomials

III. Subtraction of monomials and polynomials

IV. Multiplication
    A. Of a polynomial by a monomial
    B. Of a polynomial by a polynomial
    C. Application to multiplication of two digit whole numbers

V. Division- The concept of separate denominators

VI. Concluding remarks

Comments:

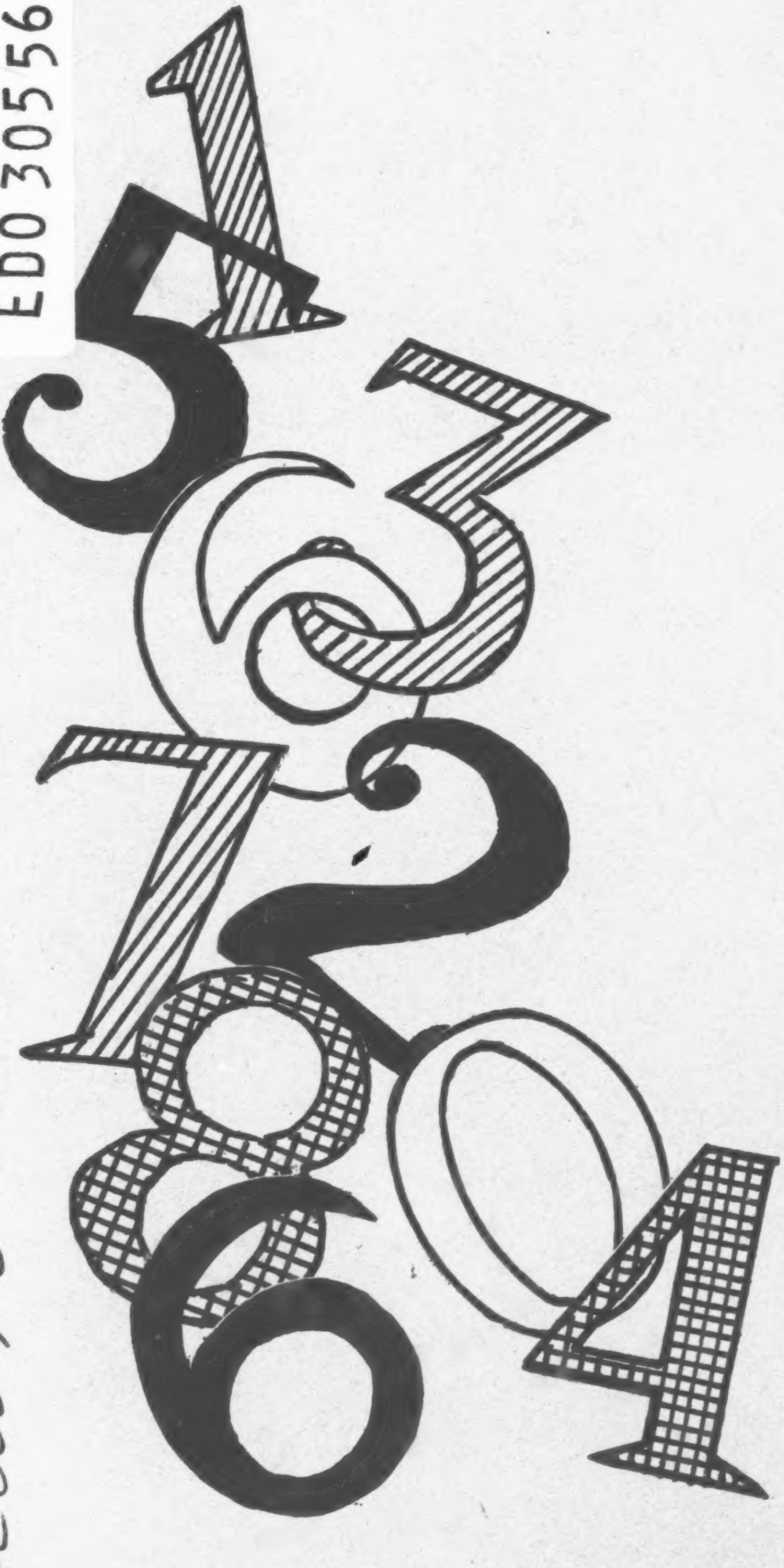
If you have some time left, the materials in chapters 8 and 9 are both interesting and useful. Geometry will be emphasized in Related Math II next year.

BESE-Title III

Teacher's Guide -10

RELATED MATH II

ED030556



SE005910

EDGEWOOD ISD INSTRUCTIONAL TELEVISION-KHS 77

RELATED MATH II

TEACHER'S TELEVISION GUIDE

EDGEWOOD INDEPENDENT SCHOOL DISTRICT
INSTRUCTIONAL TELEVISION
KHS - 77 - TV

MR. EARLE BOLTON, MATH COORDINATOR

YOUR COORDINATOR'S MESSAGE

The lesson outlines that follow are designed to give you an idea of what to expect when a telecast is scheduled for your class. The telelessons are given for the purpose of providing enrichment and coherence for the entire math program and are not, in any way a substitute for what you, the teacher, will do in the classroom.

You are the key to successful learning and the telelessons are only a part of the overall learning situation.

In order to be better prepared for what is going to be discussed on TV please read each outline carefully before air time and where special preparations are required, take care of these necessities before the lesson begins. Your cooperation on this point is especially important, as the instructor will assume that these preparations have been made before he begins.

In some cases it may not be possible to cover all the material listed in the outline. In such cases you should, after the telecast, cover all topics that were ommitted because subsequent lessons may be based on some of this information.

Be sure to keep up to date and pace your class so that you will be discussing the topic that is to be covered on TV at the time it is scheduled. Deviation of a day or so either way will not matter but for maximum success we should all try to be together.

If you have suggestions or criticism, both adverse and complementary, please let us know. Only with your help can we make team-teaching through television a success.

Best of luck for a successful course!

Earle H Bolton
Earle H. Bolton
Mathematics Coordinator

RESPONSIBILITIES OF THE CLASSROOM TEACHER

BEFORE THE TELECAST:

Turn the receiver on five minutes before the scheduled time. Using the Teacher's Guide, the classroom teacher should give the students a general idea of what will be covered on the telecast.

Arouse the students' interest.

Introduce the subject matter.

Prepare the students for the lesson.

The teacher should set up a receptive atmosphere and adjust the TV receiver for a clear picture and good sound.

DURING THE TELECAST:

The classroom teacher should be in position to watch both the receiver and the students.

Supervise your class closely.

Observe students reactions.

Take notes for personal use.

AFTER THE TELECAST:

The sessions after the telecast should be used to promote enthusiasm and to furnish students an opportunity to perform individually. It is essential that some follow-up be provided.

Lead discussions.

Answer questions.

Explain vocabulary.

Lead into related activities (some of which are listed in the Teacher's Guide).

ABOUT THE COURSE

RELATED MATH II is the second in a series of two courses designed to fit the needs of the average student who is not prepared for Algebra I in the 9th grade. The two course sequence of material as Algebra I, only spread over a two year period. The emphasis is on algebraic concepts. However, some goemetry is included in the second course. Completion of Related Math I and II will satisfy graduation requirements in the Edgewood Independent School District, but better students are urged to take Geometry and Algebra II after completing both Related Math Courses.

Page numbers, which appear in the upper right hand corner of each lesson outline represent the approximate place in the text where each class should be during the week indicated. The pace, as dictated by the TV schedule, was determined after several semesters of trial and represents the pace that has been followed by several successful teachers.

ABOUT THE TEXT

The text outline for this TV series is Modern Basic Mathematics, Book II by Skeen and Whitmore (Singer, 1964). All page numbers and chapter headings refer to this text.

ABOUT THE TEACHER

Earle H. Bolton is coordinator of Mathematics for the Edgewood Independent School District of San Antonio, Texas. A classroom teacher at the Edgewood High School for seven years, he has taught mathematics for both high ability and low level students. Mr. Bolton received his B.S. degree from the Georgia Institute of Technology in 1954 and his MS in Mathematics from Trinity University in 1965.

RELATED MATH II TENTH GRADE

SEMESTER TELEVISION OUTLINE

LESSON NUMBER	DATES	TOPIC
1	Sept. 10-Jan. 21	Introduction
2	Sept. 17-Jan. 28	Operations
3	Sept. 24-Feb. 4	Introduction to Per Cent
4	Oct. 1-Feb. 11	Mathematical Sentences
5	Oct. 8-Feb. 18	Solving Inequalities
6	Oct. 15-Feb. 25	Geometry I
7	Oct. 22-Mar. 4	Geometry II
8	Oct. 29-Mar. 11	Polynomials I
9	Nov. 5-Mar. 18	Polynomials II
10	Nov. 12-Mar. 25	Algebraic Fractions
11	Nov. 19-Apr. 1	Word Problems
12	Nov. 26-Apr. 8	Graphing
13	Dec. 3-Apr. 15	Simultaneous Equations
14	Dec. 10-Apr. 22	Square Root
15	Dec. 17-May 29	Quadratic Equations
16	Jan. 7-May 6	Film- Donald in Mathmagic Land

OUTLINE SUBJECT TO REVISION

ALL TELECASTS WILL BE ON CHANNEL 13 ON TUESDAYS

9:05, 10:25 and 1:55

Lesson I Introduction Pages 1-26

Objective: To introduce the series and give some basic foundations for further study. To compare the sets of real numbers

Lesson Outline

I. Introduction

  A. What to expect of the course

  B. What is expected of the students

  C. How to use the TV instructions

II. Roman numerals- A comparison with our base ten system

III. The base five system of numbers

IV. Classification of numbers

  A. Natural numbers

  B. Whole numbers

  C. Integers

  D. Rational numbers

V. Union and intersection of sets

VI. Absolute and algebraic value

Comments:

Omit the triangle system and concentrate on base ten. The purpose of introducing all these other number systems is to illustrate the properties of the base ten system.

Lesson II Operations with Integers
Pages 27-38

Objective: To review the four fundamental operations of integers and rational numbers

Tell Your Students- to note that when we subtract, we're really ADDING THE OPPOSITE

Lesson Outline:

I. Operations with integers

  A. Addition-subtraction

  B. Multiplication-division

II. Operations with the rational numbers

  A. Common denominators

  B. Reducing-raising

  C. Multiplication and division

  D. Inverse and reciprocal

III. Numbers that are not rational

Comments:

These first few lessons serve as a review of Related Math I. Very little of this information is new. It is hoped that students will be able to pick up any techniques that they missed in the first year's course and be ready to move rapidly when new topics are reached later on.

Be sure to remind your students that when we subtract, we are actually adding the opposite. Some students seem to remember what they're doing better if the process is stated this way.

Lesson III Percent Pages 39-60

Objective: To review the fundamental operations with decimals
To review the meaning and uses of percent

Lesson Outline

I. A brief review of the fundamental operations on decimals

   A. The meaning of percent

   B. Changing from fraction to decimal to percent

II. Using the principles of percent to solve problems

   A. Finding the base-rate-percentage –

   B. Applications

      1. Interest

      2. Discount

      3. Taxes

Comments:

The methods of identifying the base and/ or rate in a percentage problem, while not infallable, are correct most of the time. Usually if our students will locate the word "of" in a problem, the number following "of" will be the base. Hopefully, they will recognize the base because of its position and relationship in the problem, but if they can"t figure out which number is the base by logic, they can find it by association with a word or group of words.

Lesson IV Mathematical Sentences Pages 61-74

Objective: To review the techniques of solving linear equations and inequalities in one unknown.

Lesson Outline

I. Mathematical sentences

   A. Types -----true, false, open

   B. Inequalities-equations

II. "Set builder" notation and its use

III. Solution of equations and simple inequalities

IV. Graphing solution sets on the number line

Comments:

This is the first of two TV lessons on mathematical sentences. Emphasize this important area, as a knowledge of how to solve equations and inequalitites is essential to competency in mathematics. Each of our students should be able to solve any linear equation by the end of this course.

Lesson V   Solving Inequalities   Pages 75-106

Objective: To discuss the processes of solving linear inequalities

Lesson Outline

I. Solution of simple inequalities

II. Compound inequalities

    A. Solution

    B. Graphing the solution

III. The importance of knowing the universe in which you are working

IV. Formulas and their use

V. The formula as a type of mathematical sentence

VI. General conclusions about inequalities

Comment:

Inequalities are just as important as equations. Students usually enjoy graphing compound inequalities on a number line and finding the solution visually. This is probably the easiest and best technique. Discuss problems of the type $|x| > 5$ or of the type $|x| < 5$. Here's a place to get a good discussion going. It's also a good place for them to learn the exact meaning of absolute value.

Lesson VI Geometry I Pages 107-116

Objective: To introduce the study of geometry through the study of ratio and proportion

Lesson Outline

I. Geometry

   A. Ratio and proportion

      1) Product of means and extremes

      2) Solution of problems by direct proportion

   B. The symbols of geometry

II. Similar geometric figures

III. Conditions necessary for similarity

IV. Solution of some typical geometric problems using proportions

Comments:

Our students usually enjoy geometry. However, at this stage, keep it informal and simple. You can review fractions decimals, etc. by using problems that have fractional parts when discussing proportions and similarity.

Point out the fact that although we are comparing "small triangle to large triangle" in the section on similarity (IV,above), we are comparing corresponding sides.

Lesson VII Geometry II Pages 117-158

Objective: To continue the study of geometry with emphasis on the circle.

Lesson Outline

I. Circles and spheres
    A. The parts of a circle
    B. The parts of a sphere
    C. Great and small circles
II. Locus- Definition and examples
III. Central angles and their relationships to arcs and chords
IV. The circumference of a circle
V. Inscribed angles---finding the size when the arc is known

Comments:

Omit chapter 4 (pp. 159-191). This is a chapter on trigonometry and should be left out for the sake of time. Next week's TV lesson will move into chapter 5.

5

Lesson VIII Polynomials I Pages 199-215

Objective: To define the various types of polynomials, to review the laws of exponents, and to suggest some practice in using polynomials

Lesson Outline:

I. Review of the laws of exponents

II. Definitions of polynomial expressions

III. Fundamental operations on polynomials

    A. Using the distributive law

    B. Short cuts in multiplying

IV. Multiplying two binomials together

Comments:

If we are moving rapidly or too slowly please let us know. The schedule is always subject to revision when conditions warrant it.

Lesson IX Polynomials II Pages 216-246

Objective: To identify some of the patterns that appear when squaring a binomial
To discuss the process of factoring

Lesson Outline

I. Division of polynomials

  A. Division of a polynomial by a monomial

  B. Separate denominators

  C. "Long" division

II. Factoring (general)

III. How to identify trinomial perfect squares

IV. The difference of two squares

  A. How to identify

  B. How to factor

V. The "middle" term when squaring a binomial

Comments:

Just about everything that we do in this course from now on will involve a knowledge of how to factor. This is a very important topic and must be reasonably mastered before moving on. Emphasize the patterns that exist in factoring.

Lesson X Algebraic Fractions Pages 253-284

Objective: To discuss the techniques of working with problems in algebra which involve fractions

Lesson Outline

I. Common denominators

   A. In arithmetic

   B. In algebra

   C. The product of the denominators

II. The four fundamental operations on algebraic fractions

III. Complex fractions

Comments

Algebraic fractions, like the fractions of arithmetic, cause some difficulty to our students. A lot of drill in this area may be necessary.

Lesson XI Word Problems Pages 286-292

Objective: To discuss some specialzed techniques needed to work several selected problems from the text.

Lesson Outline

I. Introduction to word problems

    A. Read carefully

    B. Apply what is read

II. Work problems

    A. Typical problems on p. 288

    B. The use of a chart

III. Distance, rate, time problems

IV. Using a chart

V. Examples of the solutions of some selected problems

Lesson XII Graphing Pages 309-320

Objective: To review the techniques of graphing a linear equation. To introduce the concepts of slope, intercept and the slope-intercept form

Lesson Outline

I. The coordinate plane

- A. Combining two number lines to form the coordinate axes
- B. The four quadrants

II. Graphing a linear equation

- A. A complete problem of the form: $aX + bY = c$
- B. The meaning of the graph

III. The slope of the line

- A. Meaning
- B. How to find the slope

IV. The slope-intercept form of a linear equation

- A. $Y = mX + b$
- B. Families of lines

Lesson XIII Simultaneous Equations Pages 325-346

Objectives: To review the algebraic methods of solving a pair of equations in two unknowns and to show practical applications of these techniques to word problems.

Lesson Outline

I. Reference to the intersection of the graphs of two equations in two unknowns

II. Various algebraic methods of solving equations in two unknowns

   A. Substitution

   B. Addition-subtraction

III. Solving word problems using two equations (type on pages 333-341)

Comments:

Here again we have a section on word problems. Students will probably prefer using two equations to solve many word problems but they should understand at the outset that they must ALWAYS have at least as many equations as they have unknowns in order to insure a unique solution. $X + Y = 10$ has an infinite number of solutions. So does $X - Y = 2$, but the intersection of these two is unique. (two equations-two unknowns)

Pages 347-370 may be omitted if time is pressing or may be used as "filler" if time is available.

Lesson XIV Square Root Pages 371-415

Objectives: To give a complete overview of the techniques of working with algebraic expressions containing radicals

Lesson Outline

I. The meaning of square root

   A. Comparison of squaring and taking the square root

II. Irrational numbers

   A. Meaning

   B. Identification of irrationals

III. General operations with radicals

   A. Addition

   B. Multiplication and Division

   C. Transforming (reducing) radicals

   D. Rationalizing the denominator

Comments:

Make sure your students understand that $\sqrt{a^2+b^2}$ does not equal $\sqrt{a^2} + \sqrt{b^2}$ while $\sqrt{a^2b^2}$ does equal $\sqrt{a^2}\ \sqrt{b^2}$ or a b. Use numbers to illustrate this point.

Lesson XV Quadratic Equations Pages 417-443

Objective: To identify quadratic equations and to discuss the three basic methods of solving quadratics

Lesson Outline

I. The identification and nature of quadratic equations

II. Methods of solving quadratics

   A. Factoring

   B. Completing the square

   C. The quadratic formula

III. Applications of quadratics

Comments:

Be sure to cover quadratics thoroughly. If time will not permit adequate coverage of all three techniques, omit completing the square but not the methods of factoring and the formula. You may have to just say, "This is a formula that will give the answers to any quadratic", but do this only as a last resort. Preferably, a great deal of time should be spent in DERIVING the quadratic formula for better understanding of why it works.

Lesson XVI Motivational Lesson

Objective: To motivate capable students to go on in their mathematical studies while still in high school

Lesson Outline

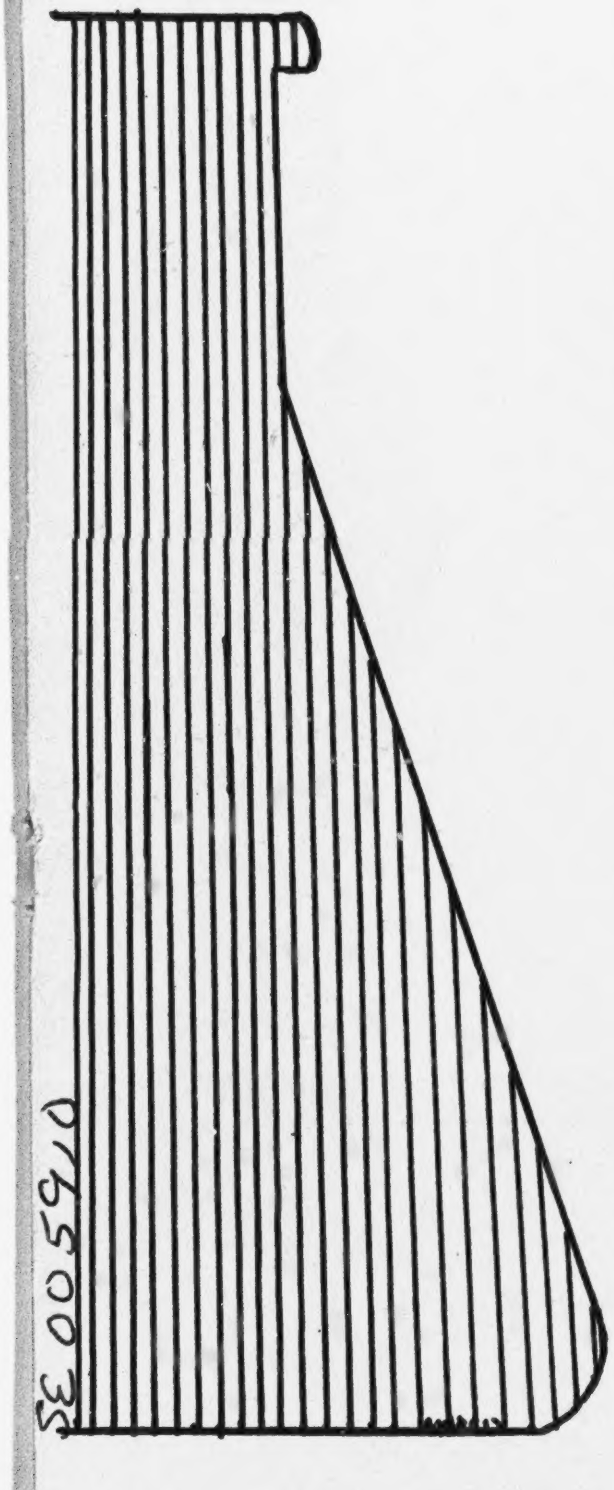
Film - Donald in Mathmagic Land

A motivational film produced by Walt Disney Studios, This film deals with some of the many applications of mathematics and is in cartoon form.

ED030556

BESE-Title III

TEACHER'S GUIDE — 9



SE 005 910

SPECTRA

EDGEWOOD ISD
INSTRUCTIONAL
TELEVISION
KHS 77

SPECTRA

TEACHER'S TELEVISION GUIDE

PHYSICAL SCIENCE - GRADE 9

EDGEWOOD INDEPENDENT SCHOOL DISTRICT
INSTRUCTIONAL TELEVISION
KHS77 - TV

MRS. JUNE GUERINGER, SCIENCE COORDINATOR

COORDINATOR'S MESSAGE

The science television lessons should be an integral part of the science program. In team teaching, it is quite important that we are together in our topics. Both classroom and television lessons will be more meaningful to the students if our lessons are coordinated. We have prepared this outline of television lessons to give advance notice of the topics to be covered. We hope this will help you with your planning.

Please give the lesson outline to your students before they view the lesson. The outline will help them visualize the sequence and relationship of materials in the lesson. It is important for students to take notes during the telecast. At first, note taking may be difficult, but it should be stressed because of the importance of this ability. Please develop a testing program that will encompass the televised materials as well as text materials.

The television instructor will confer regularly with the classroom teachers for the purpose of evaluation and improvement of this program. Any suggestions will be gratefully accepted. With your help, we can make television time a valuable component in the education of our students.

June Gueringer
June Gueringer
Science Coordinator

RESPONSIBILITIES OF THE CLASSROOM TEACHER

BEFORE THE TELECAST:

Turn the receiver on five minutes before the scheduled time. Using the Teacher's Guide, the classroom teacher should give the students a general idea of what will be covered on the telecast.

Arouse the students' interest.

Introduce the subject matter.

Prepare the students for the lesson.

The teacher should set up a receptive atmosphere and adjust the TV receiver for a clear picture and good sound.

DURING THE TELECAST:

The classroom teacher should be in position to watch both the receiver and the students.

Supervise your class closely.

Observe students reactions.

Take notes for personal use.

AFTER THE TELECAST:

The sessions after the telecast should be used to promote enthusiasm and to furnish students an opportunity to perform individually. It is essential that some follow-up be provided.

Lead discussions.

Answer questions.

Explain vocabulary.

Lead into related activities (some of which are listed in the Teacher's Guide).

ABOUT THE SERIES

It is hoped that "Spectra" will be an effective audio-visual aid and an integral part of the classroom science program. This series is made up of sixteen 30 minute lessons. The lessons have been paced with the course outline in mind. It is essential that you consider this pacing when you plan your daily lessons. The television lessons are of little value to the students if the classroom work is not correlated with the television lessons. You must provide for individual differences through the depth of study of each topic, not by the length of time spent on the topic.

There will be many demonstrations in the television lessons, but do not let them take the place of laboratory activities in the classroom.

ABOUT THE TEXTBOOK

This series is correlated with the textbook Modern Physical Science by Brooks, Tracy, Tropp, and Friedl. The philosophy of the textbook is to relate the study of science to the experiences of the students. The television lessons have been planned in accordance with the suggested lesson outline in the Teacher's Edition.

ABOUT THE TEACHER

The instructor for "Spectra" is Mrs. June Gueringer, Science Coordinator for the Edgewood Independent School District. She has a B. A. degree from the University of Texas and an M. A. degree from Our Lady of the Lake College. Mrs. Gueringer taught chemistry and general science at Edgewood High School before assuming her present duties. She is vice-president of Theta Beta Chapter, Delta Kappa Gamma Society.

TELEVISION OUTLINE

Channel 13 Wednesdays 8:35,10:55,1:25

Lesson Number	Dates	Lesson Title
1	Sept. 4, Jan. 22	Matter and Its Measurement
2	Sept. 11, Jan 29	Elements, Compounds and Mixtures
3	Sept. 18, Feb. 5	Gases of the Air
4	Sept. 25, Feb. 12	Chemical Reactions
5	Oct. 2, Feb. 19	Water
6	Oct. 9, Feb. 26	Chemicals in the Home
7	Oct. 16, Mar. 5	Metallurgy
8	Oct. 23, Mar. 12	Machines
9	Oct. 30, Mar. 19	Behavior of Matter
10	Nov. 6, Mar. 26	Heat Energy
11	Nov. 13, April 9	Sound
12	Nov. 20, April 16	Light
13	Dec. 4, April 23	Electricity
14	Dec. 11, April 30	Magnetism
15	Dec. 18, May 7	Electrostatics
16	Jan. 8, May 14	Atomic Energy

Outline Subject to Revision

Lesson 1 MATTER AND ITS MEASUREMENT

Purpose: To develop an understanding of the relationship of measurements to matter

To show the importance of measurement in the study of science

Vocabulary: meter, liter, gram, mass, density

Lesson Outline:

I. Measurements of matter
   A. Historical
   B. English system
   C. Metric system
II. States of matter

Comments:

Your students have been introduced to the metric system in seventh grade math class. However, I think you should have some measurement activities to use as follow up for this lesson to give them experience in the application of measurements to scientific study.

Textbook correlation:

Modern Physical Science, Chapter 1

Lesson 2	ELEMENTS, COMPOUNDS, AND MIXTURES
Purpose:	To develop an understanding of the elements and how they are bonded together to form compounds
Vocabulary:	atom, molecule, compounds, symbols

Lesson Outline:

I. The elements

  A. Metals

  B. Non metals

  C. The Periodic Table

II. Compounds

III. Mixtures

Comments:

It is important that our students have a basic chemistry education. They need a good background in elementary chemistry for the biology course they will have next year. Have them do as many activities as you can.

Textbook correlation:

Modern Physical Science, Chapter 1

Lesson 3	GASES OF THE AIR
Purpose:	To introduce some concepts about gases through the study of the gases of the air
Vocabulary:	fluid, Priestley, Lavoisier, oxidation, inert gases

Lesson Outline:

I. Air

II. Oxygen

   A. Historical Experiments

   B. Oxidation

   C. Dust Explosions

III. Pollutants

Comments:

Make sure that all concepts presented in this lesson are well understood. Perhaps you can prepare some oxygen immediately after the lesson. This would be a good time to mention fire prevention.

Textbook correlation:

Modern Physical Science, Chapter 1

Lesson 4 CHEMICAL REACTIONS

Purpose: To introduce the students to chemical reactions and the writing of chemical equations

Vocabulary: chemical equation, reactants, products, symbols, molecules, radicals

Lesson Outline:

I. Introduction to chemical reactions
    A. Acids and bases
    B. Acids and metals
    C. Oxides
    D. Organic

II. Chemist's shorthand

Comments:

You may not want to spend time on the writing of chemical equations, but make sure that your students understand what an equation represents. Have some laboratory work following this lesson to help the students understand chemical reactions.

Textbook correlation:

Modern Physical Science, Chapter 1

Lesson 5 WATER

Purpose: To develop an understanding of the concepts about water and the chemical treatment of it

Vocabulary: ground water, water table, distillation, chlorination, fluoridation, aeration

Lesson Outline

I. The water cycle

II. Water purification

III. Water softening

IV. Water pollution

Comments:

This is a very practical topic. It will relate science to every day life and can be made very interesting for the students. Have some of your students contact the City Water Board about literature concerning San Antonio's water supply.

Textbook correlation:

Modern Physical Science, Chapter 2

Lesson 6	CHEMICALS IN THE HOME
Purpose:	To introduce consumer chemistry This topic explores the practical aspects of chemistry.
Vocabulary:	leavening agent, synthetic, concrete

Lesson Outline:

I. Leavening agents

II. Building materials

III. Textiles

Comments:

There is a variety of topics in this chapter that may be helpful to your students. We will cover only a few of them in the television lesson. This may be a good time to assign reports to be given orally on these topics.

Textbook correlation:

Modern Physical Science, Chapter 2

Lesson 7 **METALLURGY**

Purpose: To develop understanding of some basic principles of metallurgy

Vocabulary: ore, smelting, reducing agent, alloys

Lesson Outline:

I. Extracting metals from ores

II. Electrolysis

III. Flame tests for metals

Comments:

This chapter relates to the general education of the students. They probably do not know much about metallurgy, and they may not be very interested in it. If this is true of your class, please do not bore them with too many details. Only a few days have been given to this topic in the course outline.

Textbook correlation:

Modern Physical Science, Chapter 3

Lesson 8 MACHINES

Purpose: To gain an understanding of the concepts of force and the use of machines

Vocabulary: friction, gravity, vector, torque, mechanical advantage, input, output, work

Lesson Outline:

I. Force

II. Mechanical advantage

III. Efficiency

Comments:

There are many very important concepts in this chapter. Be sure that you develop these concepts on a level appropriate to your students' ability. We have tried to deal with the above topics simply, but make sure that your students understand the material.

Textbook correlation:

Modern Physical Science, Chapter 4

Lesson 9 BEHAVIOR OF MATTER

Purpose: To develop an understanding of the behavior of matter under the influence of some forces

Vocabulary: resilient, surface tension, hydraulic, buoyancy

Lesson Outline:

I. Elasticity

II. Surface tension

III. Pressure

IV. Buoyancy

Comments:

Follow up with as many activities as possible. This material leads effectively into the concepts of work, power, and energy.

Textbook correlation:

Modern Physical Science, Chapter 4

Lesson 10 **HEAT ENERGY**

Purpose: To gain understanding of the concepts of heat, temperature, and the transfer of heat

STP, calorie, Btu, specific heat, heat of fusion, heat of vaporization

Lesson Outline:

I. Temperature

II. Quantity of heat

III. Transfer of heat

  A. Conduction

  B. Convection

  C. Radiation

Comments:

Be sure that your students are familiar with several temperature scales. If your students do not know how to convert Celsius and Fahrenheit degrees, this is a good time to learn. Do some experiments that will show the methods of transferring heat.

Textbook correlation:

Modern Physical Science, Chapter 5

Lesson 11	SOUND
Purpose:	To develop an understanding of wave motion and sound energy
Vocabulary:	transverse wave, longitudinal wave, sound, wavelength, frequency, medium

Lesson Outline:

I. Vibrations

II. Wave characteristics

III. Transverse waves

IV. Longitudinal waves

Comments:

This lesson is introductory in nature. You will have to develop the concepts. Be sure that your students understand wave motion.

Textbook correlation:

Modern Physical Science, Chapter 6

Lesson 12 LIGHT

Purpose: To extend basic understanding of the concepts concerning light

Vocabulary: photons, electromagnetic spectrum, polarize, laser

Lesson Outline:

I. Source of light

II. Theories of light

III. Polarized light

IV. Laser

Comments:

We will introduce light in this lesson, but there are many aspects of the topic that we will not have time to touch upon. Please develop the subject matter well because there are many important concepts in this chapter. You can teach color, visible light, and lenses much more effectively in the classroom than we can.

Textbook correlation:

Modern Physical Science, Chapter 7

Lesson 13 ELECTRICITY

Purpose: To develop an understanding of electricity and electrical circuits

Vocabulary: potential difference, insulators, conductors, rheostat, ampere, parallel circuit, series circuit

Lesson Outline:

I. Potential difference

II. Resistance

III. Current

IV. Series circuit

V. Parallel circuit

Comments:

Make sure that your students have a complete understanding of current electricity. Have them work some Ohm's Law problems and become familiar with the formula. Have them take readings on their electric meters at home to determine how much electricity they use in a given period of time.

Textbook correlation:

Modern Physical Science, Chapter 8

Lesson 14 MAGNETISM

Purpose: To develop an understanding of the principles of magnetism and the relationship between magnetism and electricity

Vocabulary: magnet, repel, attract, magnetic field, electromagnets

Lesson Outline:

I. Magnetic poles

II. Magnetic fields

III. Electric currents and magnetism

IV. Electromagnets

Comments:

The study of magnetism should be review material for your students. However, make sure that they understand it. Plan some activities with electromagnets.

Textbook correlation:

Modern Physical Science, Chapter 8

Lesson 15 ELECTROSTATICS

Purpose: To develop an understanding of electrostatics

Vocabulary: static, charged, electroscope

Lesson Outline:

I. Historical

II. Static charges

III. Van de Graaff generator

Comments:

This topic should tie in the laws of electricity and laws of magnetism. This might be a good time to review magnetism and electricity by comparing them. If you do not have time to cover the entire chapter well, concentrate on the first section only.

Textbook correlation:

Modern Physical Science, Chapter 9

Lesson 16	ATOMIC ENERGY
Purpose:	To develop an understanding of the concepts of atomic structure
Vocabulary:	alpha, beta, gamma, half-life, transmutation, fusion, fission

Lesson Outline:

I. The atom

II. Radio activity

III. Atom energy

Comments:

Atomic energy is a subject in which the students are very interested. Have some good oral reports on the topics of this chapter. Use any current information that you might have from the Atomic Energy Commission.

Textbook correlation:

Modern Physical Science, Chapter 10